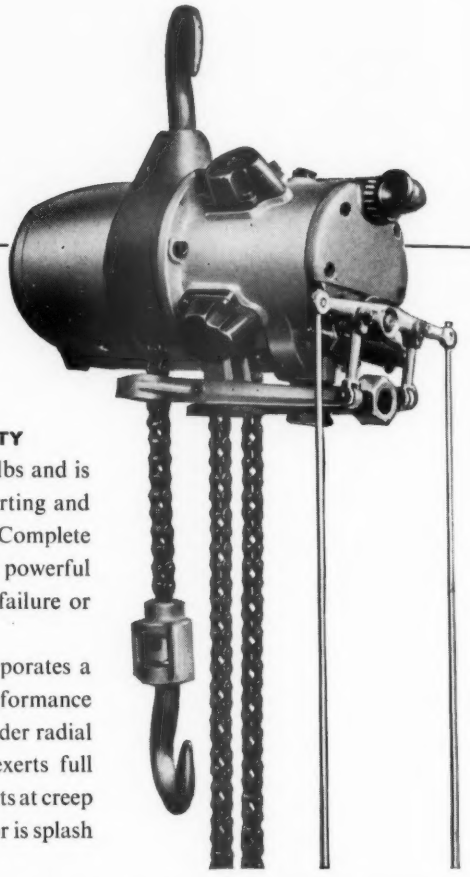
THE
RAILWAY GAZETTE

Price: Two Shillings

FRIDAY, JANUARY 30, 1959

NEW LIGHTWEIGHT AIR MOTOR HOIST FROM ATLAS COPCO



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PRINCIPAL DATA	Capacity at 85 psi	Operating speed at full load: lifting	lowering	Standard height of lift	Air consumption at full load	Weight	Hose
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WIDE FIELD OF APPLICATION

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Sheer Waste

MANY criticisms have been made of the amount of money spent on modernisation of the railways, and it has been suggested that some of this has been ill-spent. None so far has been substantiated by the march of events. For sheer waste of a large sum of public money in a short time, causing great public disappointment and not a little damage to national prestige, nothing alleged to have taken place on British Railways can compare with the frost damage to the surface of the Preston by-pass which caused that motorway to be closed last week as unsafe for traffic, until repairs could be completed at a date not specified. This was only seven weeks after the road had been opened by the Prime Minister, Mr. Harold Macmillan. The cost of the eight-mile by-pass was £3,750,000. The fact that, as so often in transport matters, the work was pushed ahead for political reasons, may well have been a major cause. A report is to be made to Mr. Harold Watkinson, Minister of Transport & Civil Aviation. The dismay caused by this fiasco, however, is nothing to that which would be occasioned in the most unlikely event of a newly-opened length of railway proving to be unsafe. This country lacks experience neither in road nor in railway construction, but the long period during which Government and popular attention have been directed to safety on the railways has resulted in a remarkably good safety record in all that concerns railway track. One reason for this is the strictness of the inspections by officers of the Ministry of Transport and the thoroughness of inquiries into railway accidents of all kinds. Such a discipline makes railways the safest form of transport. As to expenditure, one can only contrast with the Preston by-pass failure the success which has attended investment in the commercial and operating spheres of railway activity. Quick returns in the form of increased passenger traffic have resulted from the introduction of diesel trains and railcars. Where the whole or a major part of passenger and goods traffic on a line has been worked by diesel locomotives and multiple-unit trains, operating costs have soon dropped. These are outstanding examples of wise spending in a field in which the railways do not enjoy many years of experience. There has certainly been prompt action by railway managements to reap the benefits of modernised motive power, rolling stock, and equipment, and of many new techniques, but there have been very few cases of undue haste or lack of judgment.

Coaching Stock for South African Railways

ONCE again the Commonwealth Engineering Co. Ltd., of Sydney, New South Wales, has been successful in gaining a substantial order from the South African Railways for all-steel passenger coaches. The value of the contract is some £5,000,000 and covers the construction of 392 coaches by the Union Carriage & Wagon Company of Nigel, Transvaal. This is the newly-formed subsidiary of Commonwealth Engineering Co. Ltd. in South Africa, and was established after Commonwealth Engineering had successfully tendered for 332 steel passenger coaches in June, 1958. The undertaking to manufacture in South Africa probably influenced the placing of this order, and undoubtedly put the company in a strong position. When tenders were originally called in 1957, a total of 1,007 coaches were specified at a cost of some £20,000,000. It would appear that economic considerations have dictated the large scaling down of requirements. Other orders placed include a £1,600,000 contract for 322 coach sets of cast-steel bogies with Reunart & Lenz Limited of Johannesburg.

Bagnall Acquired by Dorman of Stafford

ACQUISITION by W. H. Dorman & Co. Ltd. from the Heenan Group Limited, of the whole of the share capital and undertaking of W. G. Bagnall Limited, negotiations for which are now completed, will result in a powerful combination of the tradition, experience, and resources in mechanical engineering contributed by these two concerns in the town of Stafford. The name of Bagnall has been synonymous with locomotives since 1875. Progressing from the manufacture of steam locomotives, Bagnall is now producing diesel-mechanical and diesel-electric locomotives. These builders' products can be seen on railways in many countries. They include steam locomotives working well after many years' service, for sound workmanship has always been characteristic of Bagnall. The history of Dorman, founded in 1870, is long and concerned with several aspects of mechanical engineering. A forceful chairman of the company, Haddon, during the war of 1914-18 pushed through Constantinesco's invention of fluid control to fire guns through aircraft propellers. Dorman internal-combustion engines have been produced since 1903 for many applications. Today the company's diesel engines are working in many railway locomotives.

More "Harris" Trains for Victorian Railways

THE efforts being made by the Victorian Railways to assist local industry are indicated by the decision to build the next 30 seven-car suburban "Harris" trains in Australia. All the 120 trailer cars will be constructed in railway workshops, and the 90 motor coaches, without bogies, will be built in Victoria by Martin & King Pty.

Limited. The bogies for both motor coaches and trailers will also be built by the railways with castings supplied by a contractor. Equipment and fittings common to both motor coaches and trailer cars, such as seats and doors, will be manufactured or purchased in bulk and supplied by the Victorian Railways to Martin & King for the motor coaches. Some months ago a £1,680,000 contract was placed with the English Electric Co. of Australia Pty. Ltd. for 90 motor coach and 120 trailer car sets of electrical equipment. A large part of this equipment will be manufactured at Rocklea in Queensland. In the first order of 30 "Harris" trains, the last of which is now ready to go into service, only the assembly of the motor coaches, supplied by Metropolitan-Vickers Electrical Co. Ltd., was undertaken by the railways. The trailers were supplied by Martin & King Pty. Limited.

Overseas Railway Traffics

RAILWAY receipts of South African Railways & Harbours in the week ended November 1, 1958, were £3,079,586 compared with £3,002,303 in the corresponding week of 1957. This tendency to rise above the 1957 figures continued in the following four weeks, and at November 22, aggregate receipts from April 1, were £98,684,840 compared with £95,124,376 for the same period of 1957. The general improvement in receipts is reflected in the weekly average which, at November 22, was £105,216 better than that for 1957. Harbour receipts have, in the main, remained below last year's figures, but Airways receipts have maintained a steady increase with aggregate receipts at November 22, some £1,500,000 up on the corresponding figure for 1957. Costa Rica Railway receipts for December, 1958, amounted to colones 2,067,007 compared with colones 1,758,691 in December, 1957, an increase of colones 308,316. Aggregate receipts from July 1 to December 31, totalled colones 10,087,632, compared with colones 10,394,774 in the corresponding period of 1957. Figures received from the Midland Railway Company of Western Australia Limited show that estimated road and railway receipts for October, 1958, were £A69,468 (against £A69,682 for October, 1957).

Failure of Queensland Railways Bank Loan

THE Queensland Government Railways plan to improve and extend the 3 ft. 6 in. gauge line from Townsville to the Mount Isa mineral fields has received a serious setback with the failure to secure a World Bank loan. The estimated cost of the project including the purchase of diesel locomotives and all other rolling stock is £29,000,000, far beyond the resources of the Queensland Government. The mining company, however, is involved in an expansion scheme aimed at increasing output from 4,000 tons a day of combined silver, lead, zinc, and copper ores to 13,000 tons a day. An output of 8,000 tons a day already has been reached and further increases depend entirely on the strengthening of the railway link with the coast. This large traffic potentional shows that the project is economically feasible. It would also improve deliveries of uranium ore from the Mary Kathleen fields, and an extension into the Northern Territory would provide access to the extensive cattle-breeding country on the Barkly Table-land, and help to solve one of the major problems of the North Australian cattle industry. It is understood that a further approach will be made to the World Bank under the personal authority of the Prime Minister, Mr. R. G. Menzies.

East African Railways Film Unit

SIR Arthur Kirby, Commissioner for East Africa, last week presided at a pre-view at the British Council Theatre in London of three excellent films made by the East African Railways & Harbours film unit. The first of these dealt with the building of the first deep water berths at Dar-es-Salaam and their ceremonial opening by H.R.H. Princess Margaret in 1957. The second was one of a series of films on East Africa's major industries. It showed the production of cotton from seed to finished product. The first of this series dealt with sisal, and others in course of production concern copper, coffee, tea and tourism. The third film, and by far the most important, showed the work of East African Railways & Harbours new training school which was founded by Sir Arthur Kirby, then General Manager of the railways, in 1957. This film is intended essentially for the stimulation of recruitment in East Africa, but its general interest is sufficiently great to justify a far wider audience and there is much in it which could be studied with advantage by other railway administrations. The school takes European, Asian and African students and the film gives an excellent portrayal of the work that is being done to train future employees of all races.

The Australian Gauge Problem

DIVERSITY of gauges hinders the Australian railways from providing satisfactory inter-state services, and from profiting from interavailability and standardisation of motive power and rolling stock. Although in 1848 Earl Grey, Secretary of State for the Colonies, advocated a uniform gauge of 4 ft. 8½ in., Victoria and New South Wales within 10 years had begun construction on the 5 ft. 3 in. and 4 ft. 8½ in. gauges respectively. The problem was aggravated when several States built to the supposedly cheaper 3 ft. 6 in. gauge. It is also the result of sacrifice of efficiency to political opportunism in the States, without firm control by the home or, later, by the Commonwealth Government. The story is told by Mr. Eric Harding in "Uniform Railway Gauge," the subject of a brief notice on page 125. State railway managements could not be expected always to see beyond their immediate responsibilities. Mr. Harding observes that even the late Sir Harold Clapp, who in 1945 in his report to the Commonwealth Government urged *inter alia* unification of gauges, had not earlier, as Chairman of the Victorian Railways Commissioners, advocated this course. Now that road competition is causing the railways to seek longer hauls, the benefits of unification are apparent. Today the 4 ft. 8½ in. gauge is being extended from the New South Wales border to Melbourne, but many people doubt whether this is a step towards gauge unification throughout the continent.

The Garrison Church at Longmoor

THE seating in the garrison church at Longmoor is gradually being changed over from chairs to oak pews which have been presented by friends of the Transportation Centre. A great many railwaymen have associations with Longmoor Camp, either in the pre-war Supplementary Reserve or in Movement Control during and since the war, and it is felt that they might wish, either individually or collectively, to subscribe to the provision of these oak pews. The cost is £25 to £30 for the oak, which is fabricated in Longmoor Workshops, and has attached a small brass donor's plate. In a recent issue of the *Southern Region Magazine*, Mr. N. E. Viner-Brady, New Works Engineer at Waterloo, has asked for subscriptions from ex-Southern Sappers with Longmoor associations with a view to providing one or more Southern pews. He points out that once again 156 Squadron R.E. is an all-Southern unit, and he hopes that the first pew may be ready for dedication when the unit is in camp in the early Spring.

Exercise "Excursion"

A FURTHER letter from Mr. D. Inkpen, Archivist of Thos. Cook & Son Ltd., is published in this week's issue. Mr. Inkpen's first letter has elicited interesting information. Mr. C. R. Clinker, commenting on the difficulty of defining early rail tickets issued at less than ordinary fares, believes the Bodmin & Wadebridge Railway's trains which ran from Wadebridge to Wanford Bridge and back on June 14, 1836, at one shilling per head, formed the first advertised railway excursion. He refers to an entry in the company's accounts recording disbursements for "printing bills for the excursion." Mr. Charles

E. Lee and Mr. G. A. Holt place the date earlier, on September 16, 1830. On that day a train, hauled by the "Northumbrian," carried 130 passengers from Liverpool to Manchester for a return fare of 7s. The single fare subsequently charged (the railway had been ceremonially opened on September 15, 1830) was 5s. in a "glass" coach and 3s. 6d. in an open coach. Return fares apparently were not on issue in the normal way at the time. Mr. Lee further instances "excursion traffic" on the horse-operated Oystermouth Railway in 1813 and the "excursion party" which travelled by boat from Sheerness to Whitstable, thence by rail to Canterbury, on August 16, 1831.

British Transport Advertising

THE British Transport Commission commercial advertising service is not only a valuable revenue-earning asset but, as Mr. George Dodson-Wells, Chief Commercial Advertising Officer, B.T.C., states in last Monday's advertising supplement of *The Scotsman*, an important factor in the commercial and economic life of the nation. It is the largest outdoor and transportation advertisement display organisation in the world. Gross annual turnover is well over £3,000,000, and since its formation in 1949, it has contributed more than £20,000,000 net to the revenue of the Commission. For the third quarter of 1958 its gross receipts reached a record of £855,000. One of the principal advantages of British Transport Advertising sites is that they are seen by a mass audience. Some 17,000,000 rides are made each week on London Transport underground trains by 2,000,000 different people, and British Railways carry 1,000 million passengers a year. Rental charges, however, are moderate. The service believes in the long-term value of its media, whether used individually or collectively, and its rental structure is designed to carry both itself and its customers through the vagaries of commercial fortune.

Provision for Motive Power Changes on G.N. Line

REPLACEMENT of steam by diesel motive power in the London area of the Great Northern Line of British Railways, Eastern Region, and eventual a.c. electrification are provided for in the diesel locomotive repair depot now under construction at Finsbury Park. Some details are given on page 139. The depot is well situated in relation to the running sheds, passenger stations, goods depots and yards, and carriage sidings in the area, ranging from Kings Cross passenger terminus to Hitchin minimising light running and unproductive hours for enginemen. The form of structure chosen to facilitate examination and repair work is raised tracks and high platforms. The number of diesel, and especially of diesel shunting locomotives working in, and to and from, the Kings Cross area, already considerable, will be much augmented when steam working over the Great Northern Line ceases entirely.

North Eastern Region Diesel Enterprise

WITH the introduction on January 5 of many additional workings with multiple-unit diesel sets, and the turning over to diesel traction of most of the remaining local services still operated by steam, the conversion of passenger working in the North Eastern Region from steam to diesel, apart from through long-distance expresses, is practically complete. In some areas, particularly around Leeds, Bradford, and Halifax, the success of this enterprise has been marked in the increase in passengers. The new even-interval services are hourly between Leeds and Ilkley, Bradford and Ilkley, Leeds and Bradford by the Midland route, and Bradford, Keighley and Skipton. The two last inter-connect at Shipley. On the two routes serving Ilkley, which previously at certain times in the day had gaps of from two to four hours, the improvement is very great. As with previous substitutions of diesel multiple-unit for steam trains, many running times have been substantially cut, as described elsewhere in this issue.

More C.T.C. in Rhodesia

A FURTHER section of the Rhodesia Railways, from Mpopoma, near Bulawayo, to Nyamandhlovu, on the Bulawayo-Gwaai-Wankie line, is now operated under C.T.C. Equipment for the whole of the Mpopoma-Gwaai installation was supplied by the Westinghouse Brake & Signal Co. Ltd. The only gap is now closed in the colour-light signalling system between Wankie, Bulawayo, and Gwelo. In equipping the 205 miles of track from Mpopoma to Wankie with C.T.C., 292 main signals, 210 shunt signals, and 76 power-operated points machines have been installed. Train movements are controlled from two panels, one at Dett for 19 separate sidings and the other at Sawmills covering 16 sidings. Nine "train working stations" on the 205 miles of line have been closed, releasing 27 station foremen for duties elsewhere. Concurrent with this work the whole telecommunications route from Mpopoma to Wankie has been rebuilt and four additional wires erected. Other work undertaken by the signal and telegraph engineers includes electric signalling on the new double tracks between Bulawayo and Heany and between Lochinvar and Salisbury.

Debate on B.T.C. Finances

THE House of Commons gave an unopposed Third Reading to the Transport (Borrowing Powers) Bill last week and sent it to the House of Lords, where it is likely to have a comparatively easy passage. Under it the British Transport Commission's borrowing powers are doubled to £1,200 million, to allow the modernisation programme to proceed, and the limit for deficit financing up to 1962 is raised from £250 million to £400 million. During the debate on the Committee stage, which preceded Third Reading, the Opposition returned to the attack, contending that this form of finance was quite unrealistic. Its chief spokesman, Mr. Ernest Davies, argued that by 1962, when the Commission had to start repayment of the deficit borrowing and the accumulated interest, it would be confronted with an impossible task. As the interest was also to be borrowed for seven years following each of the years when deficits are incurred by 1970, the Commission would be faced with repayment not only of the original loan of £400 millions but also some £150 million of such accrued interest. This, it was suggested, the Commission could hardly be expected to find in addition to current central charges. Even if the Commission reached its target of breaking even by 1962, which the Opposition considers equally unlikely, it could not also find the interest on these borrowings let alone their repayment.

It fell to Mr. Leslie Thomas, Conservative Member for Canterbury, speaking as a former railwayman, to draw an even gloomier picture of this unrealistic financing. He pointed out that the capital structure of the Commission was about £1,600 million. With the completion of modernisation by 1970 it would be some £3,100 million. Its Transport Stock, largely issued by way of compensation, falls due 1978-88 and carries interest of 3 per cent. On the other hand the redemption fund accumulates over 90 years, so that there is a gap between 1988 and 2036 and he wished to know how that position could be dealt with. The Minister of Transport & Civil Aviation, Mr. Harold Watkinson, decided wisely not to be drawn to look so far ahead. As was suggested from both sides of the House, however, it looks as if sooner or later there will have to be a reconstruction of the Commission's capital structure.

Meanwhile the Minister justifies the present deficit financing on the grounds that it is preferable to a subsidy, as it imposes strict financial discipline. Some Labour members find it difficult to believe that either the Ministry or the Commission can deceive itself into believing that this heavy borrowing to finance losses is anything else than a disguised subsidy. If, however, by maintaining the fiction that it is not, and that the Commission will be able to repay these loans, and also meet the heavy burden of interest thereon, a few years hence, the Commission is

driven to follow a more stringent policy of economy than it otherwise would follow, then the Minister is right and it is best to keep up the pretence. Certainly it is important that the Commission maintains the target of breaking even by 1962. For the present it is far more important to seek to reach it than to be concerned about the way in which indebtedness is to be coped with in the future.

In this regard little new emerged during the debate. The Minister awaits the result of the inquiry the Commission is undertaking at his instigation into the modernisation plan and the future prospects for British Railways. This is to be completed in the early Spring, which will be time enough for a re-assessment of the Commission's finances. In the meantime modernisation is being pressed on. Mr. Watkinson refuses to be discouraged by the fall in traffics. On the passenger side he sees signs of recovery, as for the most recent periods these traffics have compared favourably with those of a year ago. Modernisation, he contends, is reaping its reward. On the freight side he blames the fall in production, particularly steel, which he is confident will recover and with it will come higher freight traffics. He takes this view because the Commission claims that there is no evidence that traffics are being lost to its competitors now that the greater flexibility in charges is being commercially exploited. It is to be hoped that this is so, but the test will come when production begins to rise. Then it will be seen whether the gloomy view taken by the back-benchers or the confident one of the Minister and the Commission is right. The debate could not decide this, but it served one useful purpose. The reports that the back-bench Conservative transport committee had proposed a plan for the sale of the ancillary undertakings of the Commission were categorically denied both by its officers and the Minister. The latter in a written reply earlier that day had stated that no such plan had been presented to him. This is all to the good, because nothing could be worse at this critical stage in the Commission's affairs than to engage in major structural alterations of its undertakings. If the Commission is to recover it must have a respite from political interference and not be hampered by actions which can only serve political ends and not the best interests of the nationalised transport undertakings and of the public.

Special Wagons and Containers

MANY types of wagon are being developed by British Railways for individual traffics. Of a total wagon fleet of about 1,000,000, British Railways own some 2,400 of what are officially termed special wagons, divided into about 18 types. These number from one, a stator wagon, to over 800 machine wagons with less than 3 ft. from rail to floor level, in each type. They include wagons with the whole structure specially designed for carriage of boilers, girders, armour plate, and so on. There are some dozens of semi-special wagons, such as the cement wagon with air discharge, designed for special traffics but not involving such specialised basic construction. They include vehicles for traffics so diverse as anhydrite, bananas, other fruit, bulk grain, chalk, bricks (pallet wagons), motor cars, pig iron, roadstone, salt, and sand, besides the many types of mineral wagon for coal and steel. Apart from the heavy capital cost of new types of wagon, especially where few standard components can be used, account must be taken of a great deal of empty running. Triangular workings sometimes can be arranged, but many special wagons shuttle between loading and discharge points. Where no marshalling is involved, as with trainloads, the working costs are relatively low. In many cases dimensions are governed by conditions in private sidings. The size of coal wagons is restricted by the height of screens at the consigning collieries, whereas the steelworks can receive larger tonnages. The number of new wagons being developed or recently developed is probably less than a reduction in the total number of types of wagon. At nationalisation in 1948, each of the four main-line companies possessed wagons developed by its own mechanical engineers and traffic staffs for special commodities and, in addition, vehicles over 25 years old which had belonged to the railways amalgamated on grouping in 1923. In recent years the number of different types has been steadily reduced, and this policy is being actively pursued.

Special types nevertheless are necessary if some traffics are to be carried at all. Examples are those for bulk cement and motor-cars. The latter is an uncertain traffic. It depends on output in the industry which tends to fluctuate considerably, and the cost of constructing, say, a two-decker wagon accommodating six motor-cars is high. The restricted loading gauge has added to the number of types of wagon in Britain, which is believed to surpass that on any railway in the world. It has been necessary to build several types with low floors, to carry loads of exceptional dimensions.

Palletisation has resulted different types of pallet wagon. The use of pallets has not progressed in Britain as fast or as far as many people had hoped. In the case of some packaged frozen foods, which the consignors wished to despatch on pallets of specific dimensions not provided for in standard pallet vans, special highly insulated containers have been developed.

Many of the traffics which, unless great effort is made by railway staff to capture and retain them, may be attracted to the road, are suitable for containers. Much has been done to secure this marginal traffic by developing new types. The use of ramps and other devices to load and unload containers, the establishment of special container terminals, and operation of "freight liner" trains of containers on flat wagons, are among the steps to improve transits, now being investigated. The fitting of continuous brakes on all wagons is already in progress. What proportion of merchandise traffic now conveyed in ordinary standard wagons eventually will be moved in containers it is impossible to guess. Whatever may be achieved by design staffs, much effort and skill will be needed by traffic officers to capture traffic and to work it quickly and cheaply, including the minimum of empty operation of wagons and containers.

Tasmanian Government Railways in 1956-57

THE report of the Tasmanian Transport Commission for the year ended June 30, 1957, has now been received from Mr. C. E. Baird, the Commissioner. It shows a loss on all the Commission's operations except traffic control of £A.939,606, or £A.215,307 more than in the previous year. On railway services, however, the net loss was £A.1,265,027 a figure higher by £A.222,398 than that for 1955-56. Revenue under this heading declined by £A.10,304 to £A.2,534,462, whereas working expenses rose by £A.178,974 to £A.3,216,924. Loss on working was thus £A.682,462, and depreciation and interest charges were £A.230,246 and £A.352,319, respectively, to bring up the year's deficit to £A.1,265,027. Actually, the revenue receipts would have almost exactly equalled those of 1955-56 had the £A.10,000 sick leave contribution received in the latter year been continued during the year under review.

The increase in working expenditure was accounted for mainly by increased costs of wages and salaries which totalled £A.146,577. Diesel maintenance increased by all but £A.20,000 resulting from higher wages, increased mileage and trouble with roller bearings. It is significant that a reduction in train-mileage was achieved from 2,105,145 in 1955-56 to 1,854,496, mostly goods.

Diesel-electric locomotives accounted for 151,066,366 trailing ton-miles as compared with only 54,650,186 trailing ton-miles steam hauled. Fewer breakdowns and shorter periods in shops insured greater availabliity of diesel-electric and diesel-mechanical locomotives, though only one additional diesel was placed in service during the year. The "Tasman" was worked as a diesel-hauled train instead of by railcars as previously. Of a capital expenditure of £A.207,433, £A.115,000 were devoted to

wagon construction; 65 new wagons were put into traffic.

Comparison between some of the principal results of working in 1955-56 and 1956-57 is as follows:—

	1955-56	1956-57
Passenger journeys	2,977,078	2,813,449
Passenger train-miles	1,015,945	772,745
Goods, livestock and mineral tonnage	1,075,141	1,061,070
Net ton-miles	101,209,608	100,274,075
	(£A. thousands)	
Passenger revenue	163	164
Goods, etc., revenue	2,246	2,240
Total operating revenue	2,555	2,535
Working expenses	3,038	3,217
Loss on working	493	682
Interest and depreciation	549	582

To reorganise train services and reduce week-end work and overtime payments, Mr. C. Wayne, General Manager, was relieved of his normal duties for eight months, so that he could devote his whole time to solving this problem. He recommended a reduction of 150,436 freight train-miles a year, also the running of capacity-load "through" goods trains to make better use of the diesel-electric locomotives and staff, and reduce less-economic steam working. Wagon turn-round was also reduced by about half. It was expected that these recommendations would effect a saving of over £A.400,000 annually. They included reduction of stores balances and the transfer of the stores headquarters from Hobart to Launceston. During the first four months of 1957-58, a reduction of £A.79,853 had been effected by the new system of train running advocated by Mr. Wayne. A further saving of £A.10,000 a year was also expected when the two new diesel shunting engines then on order had been received.

On August 6, 1957, the 14-mile Railton-Roland line was closed to passenger traffic; goods traffic was to cease from December 1, 1957. Certain unprofitable railcar services were also being withdrawn, and replaced by road services, and train services were reduced.

Microwave Communication

NOTHING could have brought more clearly into evidence how remarkably railway communications systems have altered since the Institution of Railway Signal engineers was formed just over 46 years ago than the paper read before it, supported by a comprehensive selection of apparatus, on January 14 by Mr. P. W. Hanstock, Assistant (Telecommunications) to the Signal Engineer, British Railways, North Eastern Region, on the microwave system of exchanging messages. Gradually the equipment once so characteristic of railway communications installations, operated exclusively by battery power but giving excellent service without which railway business could not have been carried on, has been giving way to more elaborate designs. The ability to take power from supply mains has given signal engineers new forms of circuit, and equipment adapted to work over them. Such advances enabled both overhead wires and cables to serve an increasing multiplicity of purposes and offer a message-carrying capacity that not long ago could have been attained only at great cost, if at all.

The railways have not been unprogressive in these matters. Many examples of the application of very modern equipment exist in Britain, alongside much dating back many years but, within certain limitations, able still to provide essential facilities at moderate cost. All these arrangements employed line wires or cables. The latter were free from weather disturbance, but wireless communication was resorted to during the last war as a stand-by to cover certain essential lines of communication in case of emergency. It has been used to some extent for communicating in marshalling yards between train crews, ground staff, and control rooms.

The use of wireless in whatever form, especially when more than a purely local short-range service is needed, involves the problem of freedom from interference. It becomes subject to control by the Post Office, as a consequence of the legislation enacted when telegraphy became a State monopoly, later held to include telephonic communication also. The special form of wireless known as microwave was bound to interest railway managements. Some installations have been carried out abroad, usually where the overhead lines previously used were liable to serious damage from storms and so on. There are examples of these to be seen in the U.S.A., some extending over appreciable mileages, where the communications companies also are using the microwave. The Post Office in the United Kingdom now plans to do so, and already has some television transmission apparatus of this class.

Mr. Hanstock's paper was concerned primarily with the scheme which British Railways, North Eastern Region, proposes, to connect its three major administrative centres at York, Darlington, and Newcastle. Careful consideration has been given to the financial and other factors and a comparison made with a cabled system offering the facilities sought. The British Transport Commission has approved the scheme in principle and authority for it is to be sought this year in Parliament. Such a proposal involves steps not ordinarily required when running new railway communication circuits. Town planning restrictions loom large among them, with many questions affecting selection of sites away from railway-owned land or premises where equipment must be erected, power made available, and facilities given for ready access for maintenance. The planning of a microwave route calls for much detailed study. Mr. Hanstock, who has carried out much work for the North Eastern Region project, described clearly all aspects of the problems involved. If Parliament sanctions it, the scheme is likely markedly to influence future railway long-distance communications systems in Britain.

November Losses of Freight Train Traffic

(*By a correspondent*)

NOVEMBER is often a dreary month for freight train working. Last year's traffic figures were as depressing as the weather. Originating tonnage decreased by 3,353,000 tons from 1957, or by nearly 15 per cent. Merchandise accounted for 3,050,000 tons, a decrease of 277,000 tons, or 8 per cent, from 1957, but a loss of over 1,000,000 tons or 26 per cent, compared with November, 1953. The one bright spot in the Regional results was an increase of 10,000 tons, or 2 per cent, on 1957 in the Eastern Region, which profited from a wonderful production of sugar beet, leading to an upturn in sugar forwardings, and also handled more fruit and potatoes.

Mineral tonnage was down by 1,038,000 tons from 1957 and by 984,000 tons from 1953, both decreases bordering on 20 per cent. More alarming still was the fall of coal-class traffic forwardings by 2,037,000 tons, or 14·7 per cent, from 1957 and by 2,763,000 tons, or 18 per cent, from 1958. For 48 weeks to November 30, the tonnage of rail-borne coal and coke totalled 140,862,000, 12·8 million tons less than in 1957, or 8·3 per cent. Revenue from coal and coke was 6 per cent less in the last four-week period of 1958, so that the total tonnage railed last year may not have exceeded 154 million tons, against 167 million in 1957 and 175 million in 1953. The National Coal Board puts its productive capacity in 1959 at 209 million tons, compared with 215 million last year and 223 million in 1957; worse still, it foresees a demand this year for only 200 million tons. That is a bleak prospect for the railways, even if they convey some of the fuel oil, which is replacing coal in many industries.

In 48 weeks to November 30, our railways worked 17,031 million ton-miles, 2,329 million fewer than in 1957. Wagon loadings and loaded wagon-miles declined at about the same rate of 12 per cent. It was, therefore, possible to reduce freight train-miles by 8,568,000, or 6·8 per cent, and to save 2,337,000 freight engine-hours in traffic, or 7·7 per cent. With a sparse traffic, steam freight train speed rose slightly to 9·5 m.p.h. The Scottish Region moved faster at 10·7 m.p.h. than the Regions south of the

Border. The all-line average speed of 6·8 m.p.h. for diesel freight trains was rescued from insignificance by the Eastern Region's ability to work 45 per cent of total diesel freight train-miles at 9·49 m.p.h., while its steam freight trains progressed at the rate of 9·15 m.p.h.

The average wagon load at starting point rose by 1 per cent to 9·65 tons. The North Eastern Region retains the advantages it gained from the installation of high-capacity wagons more than 50 years ago and raised its wagon load by nearly one-quarter of a ton, or 2 per cent, to 11·58 tons. The train load decreased in all Regions, dwindling for the whole system from 155 to 146 tons. The output of freight train operation, measured by net ton-miles worked in a train engine-hour, dropped by 49 points, or 4 per cent, to 1,130. Though the Eastern Region statistics were about 7 per cent lower, it had the highest train load of 166 tons and the best productivity of 1,266 net ton-miles in a train engine hour.

At November 30, 1958, British Railways owned 16,182 steam locomotives and had 2,738, or 16·9 per cent under repair. They possessed 233 diesel mechanical-hydraulic locomotives, 19 of which were unserviceable. As 89 of these machines were installed last year, a repairs percentage of 8 is unreasonably high. In 1958 the stock of diesel electric locomotives was increased by 265 at various times until it numbered 923 at November 30. At that date the number under repair was 120 or 13 per cent.

The experience with diesel multiple-unit passenger vehicles is equally disquieting. At November 30 the stock of these vehicles was 2,358. Of that number 1,008 were installed last year, 243 coming into traffic in 12 weeks to November 30. Yet at that date 194 vehicles, or 8 per cent of total stock, were out of action. One begins to wonder how much net revenue this fleet of diesel-powered cars is earning.

Recently the British Transport Commission has stressed the importance of its work in carrying 274 million tons of freight by rail in 1957. That happens to be much the same quantity as was moved in 1948. Last year's carryings are likely to be less than the tonnage of about 253 million handled by the old railway companies at the lowest depth of the 1933 trade depression. Clearly 1959 is going to be a testing time for British Railways, with little prospect of a general improvement in freight train traffic and expenditure mounting faster than economy campaigns are likely to effect savings.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of Correspondents)

Delays on the London Underground

January 22

SIR,—The action of London Transport Underground passengers who recently refused to vacate trains short of their announced destinations is not misguided, senseless, or selfish in the eyes of those who have no special railway knowledge.

The lack of on-the-spot explanations as to the causes of apparently unnecessary delays and other disturbances to passengers is the greatest source of annoyance to the travelling public. A simple verbal explanation to round off the peremptory "all change" is usually all that is needed to pacify the most impatient passenger. The installation of elaborate telecommunication equipment will be useless unless the staffs concerned understand the necessity of keeping the traveller informed on matters affecting punctuality and comfort, at every stage from booking office window to destination barrier.

Yours faithfully,

JAMES TALBOT

Breakwell, Waterloo Road, Crowthorne, Berks.

The First Excursion Train

January 26

SIR,—I would like to thank, through your columns, the several correspondents who were good enough to reply to our inquiry in your issue of December 5. Our tentative conclusions are as follow.

If one accepts as applying to railways the Oxford Dictionary's definition quoted by Mr. C. E. Lee ("journey, ramble, with the intention of returning; pleasure trip for a number of persons") then the first excursion train was the privately-hired "special" from Liverpool to Manchester and back on September 16, 1830, mentioned by Mr. Lee and Mr. G. A. Holt.

If, however, we add the present-day essential of a cheap fare it fails to qualify; the charge of 7s. indicates that the novelty of rail travel, rather than cheapness, was the attraction. The emergence of the "cheap excursion" is less easy to pinpoint. The Canterbury and Whitstable trip of August 16, 1831, may be the first, but may have been only a by-product of the well-established Thames steamer excursion, while the cheap fare which the Dublin & Kingston Railway granted in 1835 for a Sunday school excursion was probably allowed on philanthropic rather than business grounds.

The earliest case mentioned so far of a railway setting out to attract excursion business by really cheap fares concerns the Bodmin & Wadebridge line. On June 14, 1836, the company ran an excursion from Wadebridge to Wenford Bridge and back at a fare of 1s. which attracted 800 passengers and had to be run in duplicate; both trains consisted largely of goods wagons. Mr. C. R. Clinker, who has kindly brought this trip to our notice, adds that the company's account books record a payment for "printing bills for the excursion." If the railway companies in the North and Midlands had developed their own cheap excursions on similar lines, we might never have heard of Thomas Cook!

Yours faithfully,

D. INKPEN
Archivist

Thos. Cook & Son Ltd., Berkeley Street, Piccadilly, W.1

The Denver & Rio Grande Western Railroad

January 25

SIR,—It is stated on page 97 of your January 23 issue that the Rio Grande Western Railroad operates in mountainous conditions, with correspondingly high expenditure. The railway's slogan is "Main line Thru the Rockies," but it surmounted all obstacles in 1956 with an operating ratio of 63·1 per cent in 1956 and 63·8 per cent in 1957, which was its most successful year. At October 31, 1958, it still operated at a ratio of 65·6 per cent despite a fall in traffic. At that date all U.S.A. railways as a system worked at a ratio of 79 per cent. The Rio Grande's performance carries one's mind back to the years before the 1914-18 war, when the North Eastern Railway's working expenses never exceeded 66·01 of gross revenue and the company paid substantial dividends on ordinary stocks.

The Rio Grande 1957 report attributed its success to the expenditure of nearly $155 million on additions and betterments in 1956 and 1957, which had made it one of the finest railroads of the U.S.A. A complete changeover to diesel motive power enabled the railway to haul an average net freight trainload of 1,597 tons at 18·6 m.p.h. in 1957 and turn out 63,313 gross ton-miles in a train-hour. The management also found the knack of taking beautiful pictures of these heavy trains as they wended their way through the mountains at remarkably low working costs.

Yours faithfully,

R. BELL

Clacton-on-Sea

THE SCRAP HEAP

Russian Railways in China (1898)

The Russian Government has sent a large quantity of railway sleepers and rails, as well as great stores of wood for building purposes, to Niu-Chwang in North China. The first locomotives will arrive shortly, and the railway embankment will soon be partially completed as far as Port Arthur. The railway to Shan-Haikwan is making progress. Embankments and cuttings at Niu-Chwang have already been begun, and they are completed for 50 miles from Shan-Haikwan onwards. . . . Niu-Chwang will soon be connected with Peking by railway. Along this line are coal mines hitherto untouched. —*From "The Financial Times" of December* 12, 1898.

Railway Exhibits at Linz

At the centenary celebrations at Linz, in Upper Austria, in November last, of the Kaiserin Elizabeth Westbahn, which was opened throughout in one stage over the 118 miles from Vienna to Linz on November 22, 1858, three old steam locomotives from Austrian railways were on view. It has been found possible to arrange these as a permanent exhibition in a small park just outside Linz station. One is an inside-frame 2-4-0T rebuilt from an old Westbahn 0-6-0 tender engine. The second, named *J. A. Haswell*, is an 0-6-0 outside-frame tender engine with outside Stephenson valve motion and slide valves horizontal above the cylinders, built in 1858 in the works of the Staatseisenbahngesellschaft, successor to the works of the Wien-Gloggnitz Bahn. The third is an outside-frame 0-6-0, *Fusch*, with outside cylinders and inside vertical slide valves, built by G. Sigl at Wiener Neustadt in 1868. All these locomotives were at work until recent years.

Also opposite the station is a small but very select railway museum, established before the war and owned by the Austrian Federal Railways. It is especially rich in exhibits from the Linz-Budweis Railway, operated over tne original 33-mile section by horse traction for 45 years from 1827. Outside the main entrance to Linz Hauptbahnhof is a bust of F. A. von Gerstner, the engineer of that line.

Centenary of Royal Albert Bridge

The Western Region of British Railways and the Plymouth City and Saltash Borough Councils have jointly completed their general plans for marking the centenary of the Royal Albert Bridge over the River Tamar, at Saltash, Devon and Cornwall.

The proceedings on May 1 will begin with a service of thanksgiving at the Parish Church of SS. Nicholas and Faith, Saltash, where, it is believed, Isambard Kingdom Brunel, the engineer responsible for design and construction, worshipped at the time of its erection. The Mayor of Saltash will unveil a plaque in memory of Brunel in Saltash Station, after which there will be a civic luncheon at the Guildhall. Mayors and town clerks of boroughs and the chairmen and clerks of urban and rural councils throughout Cornwall are being invited.

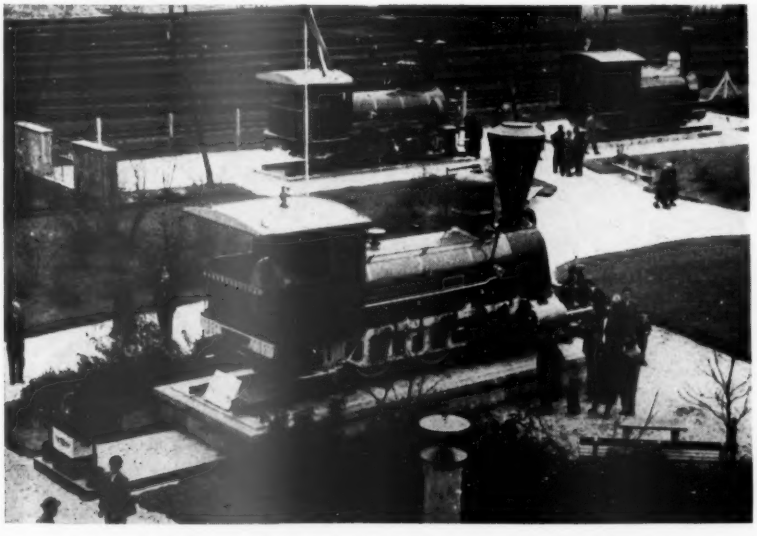
In the afternoon, a Royal Albert Bridge Centenary Exhibition in the Plymouth City Art Gallery, will be opened by Sir John Carew Pole, Chairman of the Cornwall County Council and a Member of the Western Area Board of the British Transport Commission. The Exhibition, which will be arranged by Mr. A. A. Cumming, Curator of the Plymouth City Museum & Art Gallery, with the co-operation of the Western Region of British Railways and the support of the Saltash Borough Council, will display models, plans, diagrams, and material of historical interest. It will include W. Frith's painting, "The Railway Station," depicting Paddington Station in 1862, to be lent by the Queen from the Royal collection at Buckingham Palace; and records in Brunel's own hand. The B.T.C. model railway, the largest of its kind in the country, will be installed in the North Gallery, where there will also be displayed plans, photographs, diagrams and models featuring the Western Region modernisation scheme now in progress at Plymouth North Road Station.

Later that evening, the Lord Mayor of Plymouth will entertain at dinner representatives of civic bodies, the railways, and the fighting services.

The possibility of floodlighting the Royal Albert Bridge is also under consideration.

Centenary Celebrations in South Africa

When the centenary of the Great Trek was celebrated in 1938, ox wagons from many parts of South Africa converged on Pretoria. In 1952, for the Van Riebeeck Tercentenary, stage coaches set out for Capetown. In 1960, which is the golden jubilee of Union and also the centenary of railways in South Africa, festival trains will start from outlying stations. Each town through which they pass will have its own celebration, depicting the growth of the railways and the development of the Union. The trains will converge on Johannesburg and Bloemfontein, the two main Festival of Union centres.



Permanent exhibits outside Linz main station, Austria. In the foreground is the "Fusch" built in 1868*; behind is the "J. A. Haswell" built in* 1858*; and to the right a* 100*-year-old rebuilt* 2-4-0*T. The main line to Vienna is behind*

Words in Season

When the arctic breezes blow,
Bringing frost and ice and snow,
And the bulk of us are feeling pretty blue,
And, in spite of frozen points,
Icy rails and creaking joints,
By and large, the trains persist in getting through,
For a time not much is heard
Of the harsh, complaining word
And the inference that railways are effete,
For, when other means shut down,
Faced with winter's frigid frown,
Railway transport still continues to compete.

But these gratifying views
Are not really red-hot news,
For confusion reigns in bedroom, bath and hall;
When one's cabin'd and confined
And, *pro tem* at least, resigned,
Comes the unexpected thaw—burst pipes and all.

A. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Housing Programme

By the end of 1960 the Rhodesia Railways will have spent £1,660,000 on African housing. During the past two years the Railways have built 2,088 "better type" houses for its African employees costing £850,000, and during the next two years £450,000 will be spent on 1,024 more houses.

Special Duty Wagons

The first of two 20-wheel, 55-ton special-duty rail wagons for heavy traffic to the Kariba railhead, particularly transformers, recently went into service on the Rhodesia Railways. The two wagons were purchased by the Federal Power Board. A third, of the same design, is being brought by the Rhodesian-Congo Border Power Corporation.

The first wagon arrived via Beira where it was erected with the assistance of the Portuguese. It was then brought to Bulawayo to be tested under load.

The test load comprised 920 steel sheets, $\frac{3}{16}$ in. thick, each measuring 8 ft. × 4 ft. The plates were loaded in a manner that stimulated the heaviest load that could be expected. The weight of the truck and load together will be just over 177 tons and the truck is adjustable from 64 to 74 ft. according to the type of beams used to connect the two 10-wheel bogies. These beams provide either a flat or well-top design.

Originally the first load, a 122-ton transformer, was scheduled to be shipped through Beira, but when packed for shipment in the United Kingdom, the weight was found to be some 12 tons above the original estimate. This meant that the strain on some of the bridges on the Beira route would have been too great. It was therefore brought into the country through Lourenco Marques. A special train brought it from Malvernia travelling by day only and making three night stops en route.

The wagon was constructed by Head Wrightson Teesdale, Limited, a subsidiary of Head, Wrightson & Co. Ltd., and described in our issue of January 3, 1958.

Rhodesia Railways special-duty 20-wheel 55-ton rail wagon carrying a 122-ton transformer for the Kariba dam project

CANADA

C.P.R. Communications

Canadian Pacific Railway offices in the U.K. and the Continent now have Telex and private lease cable access to the company's headquarters in Montreal. The Telex network links offices in the U.K. and on the Continent with the European head office in London. From London there is the private lease cable direct to Montreal. Through the company's telegraph system in Canada, any European office can communicate by wire to any office there.

ARGENTINA

Increases in Rates and Charges

Heavy increases have been authorised in the rates and charges of the Argentine railways. They came into effect on January 4. Basically they are as follow: main line passenger fares, 50 per cent; local and suburban fares, 60 per cent in first class and 50 per cent in one-class tickets, while second-class fares have been increased to the present first class level. Suburban season ticket rates will be increased by 30 pesos first class, 25 pesos one class, and 20 pesos second class. Goods and parcels rates generally have increased by 50 per cent. Sharp rises for pullman seats will be introduced later, while sleeper tickets will be doubled to 200 pesos. As regards Buenos Aires city transport, the minimum underground and tram fares have been increased to one peso, omnibus fares to 1·50 pesos, and trolleybus and "colectivo" fares to 1·20 pesos. Long distance motor coach transport will be seriously affected as the cost of fuel was increased by 200 per cent as from January 1.

Rio Turbio Coal

A recent technical report presented by Eng. Livio Dante Porta, who is responsible for the working of the Rio Turbio-Rio Gallegos Industrial Railway, states that the reserves of Rio Turbio coal amount to more than 400 million tons. The coal is specially suitable for burning in steam locomotives after slight adjustments in their fireboxes, and would obviate the necessity for complete conversion to diesel traction of the Argentine railways. The existing steam locomotives, according to Eng. Porta, could be adapted at a minimum cost and could be used on many lines where diesel units are not suitable.

The Rio Turbio Railway is about to receive Mallet type locomotives and 44-ton coal wagons, which will enable train loads to be increased from 1,300 to 3,000 tons, covering the 161 miles of line at a speed of 28 m.p.h. A total of 8,000,000 tons a year will be carried before the end of 1959.

UNITED STATES

Pennsylvania Station, New York

A proposal is being made by the Pennsylvania Railroad in regard to its station in New York City. This is a through station, connected with the P.RR. main line in New Jersey by a two-track tunnel under the Hudson River, and with its extensive Sunnyside yards in Long Island by a four-track tunnel under the East River, two tracks of which are used by the Long Island Railroad electric service.

It is not possible to mix freight operation with the passenger services, as the gradients through the tunnels are so severe that serious dislocation might occur unless it were possible to ensure that freight trains were given a clear non-stop run through the station. At present wagons for Long Island have to be ferried across New York Harbour, which greatly increases both the cost of operation and taxation also.

The suggestion is that during the midday non-peak hours freight trains shall have exclusive use of the Pennsylvania tracks from Newark through to Sunnyside. All passenger trains from and to the main line in New Jersey would stop

at and start from Newark, N.J. This would have relatively little effect on the long-distance trains, the majority of which arrive during the morning rush hour, and leave during the evening peak period.

The Long Island suburban service also would be unaffected, and the Pennsylvania morning and evening commuter trains from and to New Jersey residential areas also would continue as now. Rapid transit passenger service between Newark and Manhattan Island is available by the Hudson & Manhattan tubes under the Hudson River, so that inconvenience during the midday hours would be mainly confined to the change of trains at Newark.

ITALY

Straits of Messina Train Ferry

Road vehicles are now carried on the upper decks of the train ferries between Villa San Giovanni, on the mainland, and Messina, in Sicily. Access is by ramps at the ferry berths. Road vehicles previously were accommodated only on the train decks, in the space not required for railway passenger and goods vehicles.

Wagon Building in Sicily

The Sicilian Autonomous Government at Palermo, which has vigorously been promoting the island's industrial activities in recent years has laid a bill before the Sicilian Parliament designed to secure the building by Sicilian industrial undertakings of an "adequate portion" of the rolling stock for the Italian State Railways. A committee recently considered the construction by Sicilian firms of 200 refrigerator wagons of a special type. These are to form the nucleus of a fleet of refrigerator wagons for movement of citrus fruit to the mainland and beyond.

Venice to Trieste Electrification

Electrification of the Mestre (Venice) Cervignano section of the Trieste-Venice double-track main line. is expected to be completed on June 1, when the summer timetable becomes effective. The Trieste-Cervignano section was converted in 1935-36. After electrification, fast trains between Trieste and Venice will take less than 2 hr. for the journey.

SWITZERLAND

Reconstruction of Berne Station

Advantage will be taken of the reconstruction of the main passenger station at Berne to do away with the present terminus in the street in front of the station of the metre-gauge electric railway to Solothurn. The section of this line located within Berne is to be taken underground and will terminate in a low-level station under the reconstructed Federal Railway station. The tunnel leading into the low-level station, the construction of which will be taken in hand shortly, will be 771 ft. long.

WESTERN GERMANY

Alweg System Rejected

After some six months of private consultation, the Hamburger Hochbahn A.G., the Hamburg transport undertaking, has decided against the introduction of an Alweg monorail system in the city. The reason for the decision is that the supporting pillars would be undesirable in such a densely built-up city as Hamburg.

DENMARK

Railway Exhibition in Copenhagen

The State Railways are arranging an exhibition of railway motive power and rolling stock. to open shortly in Copenhagen Central Station. Exhibits are to include originals or models of French, German, Italian, Portuguese, and Swiss electric locomotives and multiple-unit electric or diesel trains, also a model of a sleeping car of the Wagons-Lits Company. A model of the Spanish Talgo train also is to be shown.

Publications Received

Uniform Railway Gauge. By Eric Harding. Melbourne: Lothian Publishing Co. Pty. Ltd., 1, Fleming Place, C.1. 8¾ in. × 5¾ in. 140 pp. Illustrated. Price 30s.—The work now in progress of linking Melbourne with the 4-ft. 8½-in. gauge New South Wales Government Railways by laying standard-gauge track alongside 5-ft. 3-in. gauge Victorian Railways lines and conversion of some of the latter, mainly in the Melbourne area, described in our issue of June 13, 1958, is a reminder that unification of the several railway gauges in Australia is now less remote than it has been for some years. This short history of a problem that has vexed Australia for more than a century is the subject of editorial comment on page 118. The author illustrates the complexity of the matter by pointing out that through running between New South Wales and Melbourne will save the expense of passenger and goods transhipment at the State border, including that of most of the traffic between Victoria and New South Wales, and occasion a transfer of much traffic from road to rail. It will not, however, in his opinion, do more. It may delay standardisation by causing Victoria and South Australia "to lose what little interest they ever had in ultimate conversion." This and other factors are explained with clarity and vigour. There are very few inaccuracies, as for example, reference to 3-ft. 6-in. gauge in India. He rightly praises the work on behalf of gauge unification of Norris G. Bell, the first Commonwealth Railways Commissioner. The chapter on defence considerations is written largely in the light of Mr. Harding's experience in the Army Department, of which he was Acting Permanent Head. The four-colour map showing gauges is helpful, but good maps to illustrate the statements made might well have taken the place of the drawings and some of the half-tone illustrations.

Kempe's Engineers' Year-Book, 1959, Vols. 1 and 2. 64th edition. London: Morgan Bros. (Publishers) Ltd., 28, Essex Street, W.C.2. 7 in. × 4¾ in. × 1¾ in. 1,324 pp. and 1,416 pp. Illustrated. Price for two volumes in case 82s. 6d.—This year's edition contains 79 chapters on theory and practice in all branches of engineering. Three sections have been revised and re-written: "Flow Metering and Mechanical Testing," "Refrigeration," and "Paints and Varnishes." Many chapters carry additional text. The chapter on railway signalling now includes details of automation in signalling, and of application of electronics to C.T.C. and to control of marshalling yards. That entitled "Foundations and Earthwork" gives details of cast in-situ concrete piles and sheet steel piling. There are some new illustrations. The index, which contains some 17,000 references, has been made more comprehensive.

Institution of Railway Signal Engineers Proceedings for 1957. London: Published by The Institution of Railway Signal Engineers and obtainable from the Hon. General Secretary, Mr. R. J. Weedon, Room 252, 222, Marylebone Road, London, N.W.1. 9¾ in. × 7¼ in. 155 pp. Illustrated. Price to non-members 15s.—This is the first issue to be printed in double column on larger pages, a great improvement, as it has enabled the illustrations to be printed with the text and folding plates dispensed with. The papers read during the year and the discussions cover a wide variety of signalling subjects. The contents include the papers set for the 1957 examination in signalling for Associate Membership and Graduateship of the Institution.

Basic Electricity — Basic Electronics. London, S.W.3: Technical Press Ltd., 1, Justice Walk, Lawrence Street.—The first of five parts of an illustrated course of technician training, based on a plan devised some years ago at the request of the U.S. Navy, has been adapted to British usage and terminology by a special electronics training investigation team of the Royal Electrical & Mechanical Engineers. The manuals are now being made available for individual, industrial and educational use. The five parts of "Basic Electricity" and the six parts of "Basic Electronics" will be published in three separate editions at a cost of 12s. 6d. net a part in each case.

Spring Stresses and Deflections

The effect of dynamic factors on design

By J. L. Koffman

THE necessity for keeping vehicle weight to a minimum, both to ensure reductions in fuel consumption, track maintenance, and other expenses, and to improve riding characteristics, focuses the attention of designers on suspension and springs.

Although air suspension systems have been under consideration for several years, many designers remain to be convinced that they suitably can replace well-proved and more conventional layouts already in use. It would appear that similar results also can be achieved with steel springs designed to ensure suitable non-linear characteristics. More thought, therefore, should be given to development along these lines, especially as a combination of steel and rubber might meet stipulated requirements.

The laminated spring also will have a role to play for it can be used not only as a spring but also to locate the axle and to reduce the bending moment imposed on the bogie frame. If suitably treated, its damping properties can be well maintained. Adequate damping, proportional to load, can be effected—a feature so far not achieved with more sophisticated designs.

As a spring unit, the helical spring has the benefit of low weight and is relatively easy to blend into the design. Nevertheless, it frequently requires the use of hydraulic dampers. These, when used with primary springs, have not always been an unmixed blessing because of the relatively severe demands imposed on them at this point. Reference now will be made to some aspects of helical spring design; the considerations relating to vehicle oscillations generally are applicable regardless of the type of spring used as long as linear characteristics apply.

Vertical Stiffness of Helical Springs

The stresses of helical springs usually are determined on the basis of static load P_s (t.). Thus, for circular section springs:

$$q_s = 8P_sDK/\pi d^3 \text{ (t. per sq. in.)} \quad .. \quad (1)$$

where D (in.) is the mean diameter of the coil and d (in.) the wire diameter, while

$$K = [(D/d) + 0{\cdot}2]/[(D/d) - 1] \quad .. \quad (2)$$

is the stress concentration factor. Generally, the stresses have come to be regarded as acceptable as long as q_s is smaller than 30 ton per sq. in.

The oscillations imposed on springs in service result in a dynamic load P_d superimposed on the purely static load P_s, the total stress being:

$$q_t = q_s \pm q_d$$

In service, q_d with primary springs can be as high as 0·4 q_s, so that q_t may vary between 1·4 q_s and 0·6 q_s, the limits to q_t being set mainly by the fatigue properties of the material. Because of this, the factor determining the spring size will be q_d or q_t and not q_s. On the basis of data originating from Gross and Lehr (1) and others, the endurance limit of Si.Mn. steels ground all over is about:

$$q_d = \pm 10 \text{ ton per sq. in.}$$

Somewhat similar values apply to engine valve springs (2), while slightly higher values are obtained for the higher range of q_s values in accordance with extensive data originating from Lipson and Noll (3). Pope's data (4) substantiates the limit of ± 10 ton per sq. in. These values are plotted in Fig. 1, which indicates that if, for example, a spring deflection of 3 in. results in a static stress of q_s=30 ton per sq. in., then the dynamic stress of ±10 ton per sq. in. will limit the dynamic deflection to ±1 in. or ±33 per cent of the static value. If service requirements make it prudent to allow for a dynamic deflection corresponding to 40 per cent of the static value, *i.e.*, 1·2 in., here, too, q_d must not exceed ±10 ton per sq. in. Consequently, q_s must not exceed 25 ton per sq. in.

It should be mentioned that for "black" springs q_d should be limited to ± 5 ton per sq. in.

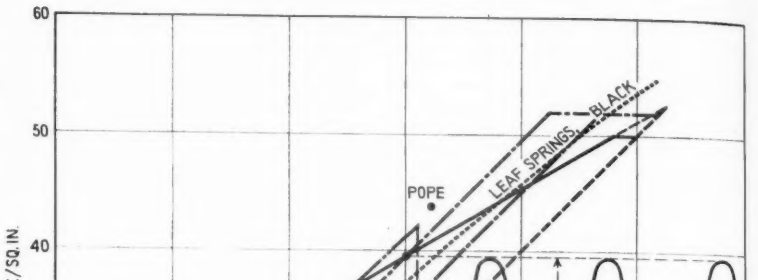


Fig. 1—Working stresses in springs

Thus, the design is controlled by dynamic considerations in accordance with which the oscillating loads are of deciding importance. From Eq. (1) and for $q_d = \pm$ 10 ton per sq. in.:

$$d = \sqrt[3]{8/\pi q_d} \times \sqrt[3]{P_dDK} = 0{\cdot}63\sqrt[3]{P_dDK} \text{ (in.)} \quad ..... \quad (3)$$

The spring rate or stiffness c is obtained from:

$$c = Gd^4/8nD^3 \text{ (ton per sq. in.)} \quad .. \quad (4)$$

where G = 5150 ton per sq. in. is the shear modulus for steel and n the number of active coils, so that:

$$n = Gd^4/8cD^3 = 645d^4/cD^3 \quad .... \quad (5)$$

Lateral Stiffness of Helical Springs

The use of helical springs to deal with vertical as well as lateral oscillations of the bolster eliminates swing links and, by simplifying the design reduces weight and maintenance expenses. Pre-war use has been made of this principle by Hanin, Kreissig, and the author (5). It later was extended to carriages in France, to diesel locomotives by the General Motors Corporation, and to underground cars by the Hamburg Elevated Railway.

Various methods for the determination of lateral stiffness of helical springs

later became available (6) and, in the following, a simple equation originating from Su-Min and quoted by Shadur, will be used. According to this, later stiffness is given by:

$$c_l = Ed^4/(1{\cdot}7kh^3 + 8nD^3) \text{ (kg. per cm.)} \quad .. \quad (6)$$

where E = 2,050,000 kg. per sq. cm. is the modulus of elasticity, n the number of effective coils, d (cm.) the wire diameter, D (cm.) the mean coil diameter, h (cm.) the spring height under load, and

$$k = (2 + m\cos^2\alpha)/2\sin\alpha$$

where $\sin\alpha = h/\pi Dn$ and $m = 0{\cdot}3$ is Poisson's ratio.

The application of Eq. (6) may be considered for a 62 ft. diesel locomotive, the 68-ton body being carried on two bogies 35 ft. 9 in. apart. Each bolster rests on four spring nests, two to each side of the centre.

Each nest comprises two springs, the main dimensions of the outer spring being: $D_1 = 21{\cdot}2$ cm., $d_1 = 4{\cdot}5$ cm., $h_1 = 46{\cdot}4$ cm. and $n_1 = 6{\cdot}6$. Consequently: $\sin\alpha_1 = 0{\cdot}1055$, $\cos\alpha_1 = 0{\cdot}9945$ and $k_1 = 11{\cdot}9$ so that $ch_1 = 360$ kg. per cm.

For the inner spring: $D_2 = 12.5$ cm., $d_2 = 2{\cdot}8$ cm., $h_2 = 46{\cdot}4$ cm. and $n = 11{\cdot}6$, so that $\sin\alpha_2 = 0{\cdot}102$, $\cos\alpha_2 = 0{\cdot}995$ and $k_2 = 11.3$. Thus, $c_{l2} = 61$ kg. per cm.

The total value of the lateral stiffness will be $c_l = 421$ kg. per cm. or 1·07 t. per in. Each assembly carries a load of 8·5 t., while the lateral displacement is limited to 1·5 in. and this occasionally is used to the full, lateral force thus being limited to about 20 per cent of the vertical load.

The moment of inertia of a locomotive body of this type about the vertical axis through the centre of gravity is obtained (7) from:

$$I_z = mr_z^2 = 68 \times 2{,}240 \times (0{\cdot}215 \times 62)^2/32{\cdot}2 = 835{,}000 \text{ (ft.lb.sec.}^2\text{)}$$

where $r_z = 0{\cdot}215$L and L is the length over buffers. The lateral stiffness of the eight spring nests is:

$$c_l = 8 \times 1{\cdot}07 \times 2{,}240 \times 12 = 230{,}000 \text{ (lb. per ft.)}$$

so that the natural frequency of body hunting (7) will be:

$$f_h = \frac{30a}{\pi}\sqrt{\frac{c_l}{I}} = \frac{30a}{\pi}\sqrt{\frac{230{,}000}{835{,}000}} = 84 \text{ (cycles per min.)} \quad .. \quad (7)$$

where $2a = 33{\cdot}75$ ft. is the distance between bogie centres. In service, the frequency of hunting was observed to be of the order of 60 to 80 cycles per min. at speeds in excess of 50 m.p.h. This might also coincide with the lateral natural frequency of the body on the springs (7) given by:

$$f_h = \frac{30a}{\pi}\sqrt{\frac{c_l}{m}} = 9{\cdot}55\sqrt{\frac{230{,}000}{68 \times 2{,}240/32{\cdot}2}} = 66 \text{ (cycles per min.)} \quad .. \quad (8)$$

The interaction between the frequency of sinusoidal wheel motion and body oscillations is indicated in Figs. 5, 6 and 7 of Ref. 7.

Helical springs also are used to deal with vertical and lateral oscillations of the bolster of carriage bogies. Thus, with one design, each bolster is carried by two triple-unit nests with $D_1 = 28{\cdot}2$ cm., $D_2 = 19{\cdot}05$ cm., $D_3 = 12{\cdot}9$ cm., $d_1 = 4{\cdot}35$ cm., $d_2 = 3{\cdot}1$ cm., $d_3 = 2{\cdot}1$ cm., $n_1 = 4{\cdot}5$, $n_2 = 6{\cdot}5$, $n_3 = 9{\cdot}5$ and $h = 37{\cdot}25$ cm.

With these values, $c_{l1} = 575$ kg. per cm., $c_{l2} = 144$ kg. per cm. and $c_{l3} = 35$ kg. per cm., so that $c_{l4} = 575$ kg. per cm. or 1·285 t. per in.

Each nest carries a tare load of 8·25 t., and lateral displacement is limited to ± 1 in. The resultant maximum lateral force corresponds to about 16 per cent of the vertical load.

Tests have shown this assembly to possess a lateral stiffness of about 1·4 t. per in. The lateral stiffness can be determined indirectly via the frequency of body hunting and the dimensions and weight of the vehicle body. In this case, the frequency was found by tests to be 1·75 and 2·2 cycles per sec., while in service the predominant frequency was 1·5 cycles per sec.

The body is about 76·5 ft. long and weighs 29·5 t. Distance between bogie centres is $2a = 51$ ft. The moment of inertia of the body about the vertical axis through the centre of gravity is:

$$I_z = mr_z^2 = (29{\cdot}5 \times 2{,}240/32{\cdot}2)\ (0{\cdot}275 \times 76{\cdot}5)^2 = 915{,}000 \text{ (lb.ft.sec.}^2\text{)}$$

while from Eq. (7), the lateral stiffness of the four nests will be:

$$c_l = I_z f^2/(a/2\pi)^2 = 915{,}000\,f^2/(25{\cdot}5/2)^2 = 56{,}500\,f^2 \text{ (lb. per ft.)}$$

so that for $f = 1{\cdot}5$, 1·75 and 2·2 cycles per sec., $c_l = 1{\cdot}18$, 1·61 and 2·1 ton per in. for each of the four nests, the value of 1·4 tons corresponding to 1·65 cycles per sec.

Spring Deflection

The total static deflection is the major factor in determining most of the natural frequencies of the vehicle (7). With vehicles relying alone on primary (axlebox to frame) suspension, static deflection is limited by considerations affecting dynamic clearances as well as bogie-frame tilting when starting or braking. Thus, for the Russian class TE.3 Co-Co diesel-electric locomotives, this value is 2⅜ in. For the class VL.22^M Co-Co electric locomotive, it is 2 in. compared with 2¼ in. with class N.8 Bo+Bo+Bo+Bo locomotives, leaf springs being used throughout.

With some Continental diesel locomotives using helical primary springs only, this value is limited to about 2·5 in., so that a value of about 2½ to 3 in. can be considered as acceptable for four-wheel bogies of locomotives running at a maximum speed of not exceeding about 60 m.p.h.

Higher values are suitable for six-wheel bogies where excessive tilting and pitching is less of a problem, but here, too, adequate clearances must be ensured.

More freedom in the choice of suitable deflection values and resultant improvement of riding qualities is offered by the design of bogies incorporating sprung bolsters. Total deflection as well as its distribution between primary and secondary suspension is determined by the mass of the body and bogies, vehicle speed versus rail length, the moments of inertia of the body about the three principal axes, frequency of sinusoidal motion of the wheels, and position of the centre of gravity of the body above the suspension and by the action of the quill drive (7).

Generally, a total static deflection of 5 to 7 in. can be aimed at with about 60 per cent allocated to the bolster springs. To a certain extent actual values will depend on the relative magnitudes of body mass to the sprung mass of both bogies. By imposing vertical stiffness between bogie-frame and axles, the drive springs of some torsionally-resilient quill drives result in increased suspension stiffness, while also demanding a close control of possible dynamic deflection. Typical values for modern carriages and locomotives are plotted in Fig 2, together with a theoretically-derived curve of mass versus deflection ratios.

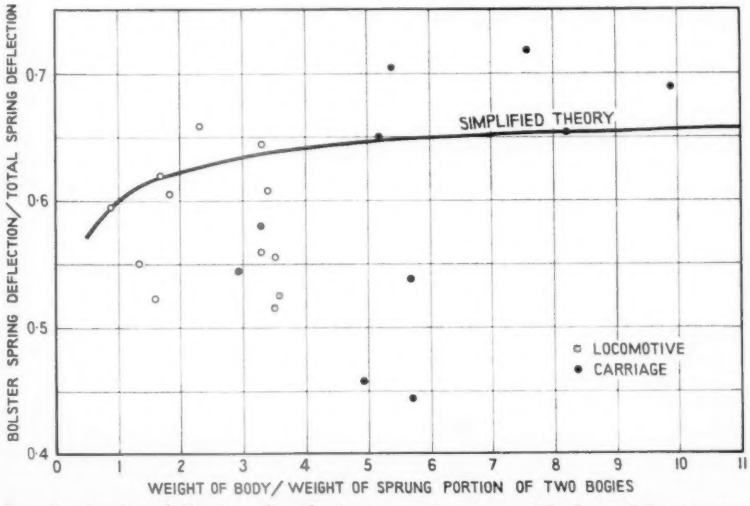


Fig. 2—Spring deflection distribution as a function of body and bogie mass ratios

The static spring stresses encountered with some modern designs vary considerably. Thus, in the case of carriages, they range from 24 ton per sq. in. for ground Cr.Vn. steel springs to 36 ton per sq. in. for normal carbon steel. For locomotives, values vary from about 30 to about 35 tons per sq. in., mostly for ground and shot-peened Cr.Mn. or Cr.Vn. steels. Nevertheless, excursions into the range of 37 and even 50 ton per. sq. in. have been encountered. The latter value is a daring move to the limit, assuming that dynamic deflection will not exceed 20 per cent of the static value.

Because spring dimensions are mainly determined by the limits set to dynamic stresses (i.e., ±10 ton per sq. in. for ground helical springs) which in turn must be related to the oscillations encountered in service, the latter become of fundamental importance. Unfortunately, relatively little information is available on this subject. Some data is plotted in Fig 3 for the primary suspension of non-bolster bogie locomotives. The steeply-rising chain-dotted curve relates to deflections encountered with bogies suffering from pronounced pitching, corrective measures being effected by the use of hydraulic dampers. Mean values are shown by dotted lines and generally are some 60 to 70 per cent of the maximum values.

It will be noted that a value of 40 per cent might be assumed as far as the dynamic deflections of primary springs are concerned. Actual deflection values will depend on the deflection due to pure bouncing, bogie- and body-pitching, and body-rolling. Thus, if the above value is to be kept low, the amplitudes of bogie pitching, as well as body-pitching and rolling, also should be kept low.

Sperling (8) suggests that, for a static deflection of 1, 2, 3, and 4 in., the dynamic allowance for carriages should be about 40, 28, 23, and 20 per cent of the static value respectively, and that this can be reduced with well-riding vehicles not subject to rolling. If this can be ensured, then the value allowed for dynamic oscillations can be reduced (Fig. 4) and the stresses corresponding to static deflection increased, but as obviously this will depend not only on the performance of the vehicle but also that of the track, it will be advisable not to cut the dynamic allowance too fine.

Apart from its obvious effect on the spring stresses, the dynamic deflections will be of importance as far as the dynamic wheel loads are concerned, a fact clearly recognised by Krepkogorsky (9). The more recent preoccupation of civil engineers with permissible rail stresses and the resultant arrival of a P/D ratio (where P (tons) is the static axle-load and D (ft.) the wheel diameter, at present limited to a value of five as far as British Railways are concerned (10), seems not to have made sufficient allowance for the effect of spring and damper action. It is reasonable to assume that, as far as the dynamic axle-load P_d is concerned, this, in addition to P, will be affected by the dynamic action of the unsprung as well as the sprung mass as excited by the road irregularities, and by the force-transmitting characteristics of the suspension.

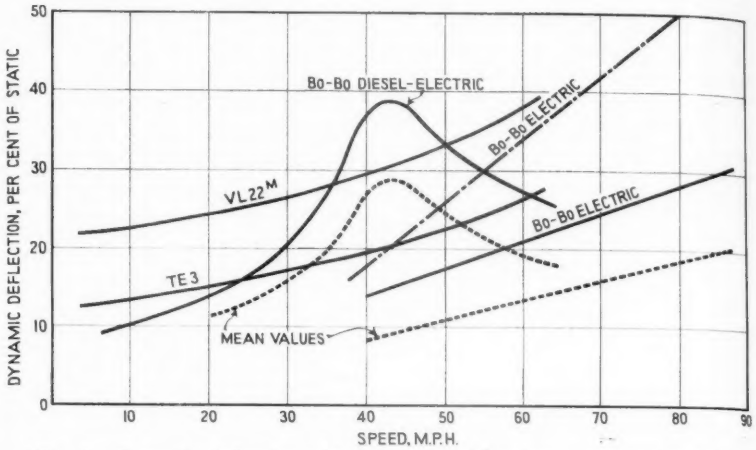


Fig. 3—Dynamic deflection of locomotives with primary suspension only

Effect of Dampers and Deflection Allocation

In the simple case of a mass resting on a spring provided with viscous (hydraulic) damper, the relation is well known which exists between the ratio r of forcing frequency f (vehicle speed) and the natural frequency of the system versus the ratio of force of excitation to the transmitted force (7, 11). These relations are more complex for a system consisting of mass resting on a spring and supporting another mass via another spring, and each spring fitted with a hydraulic damper.

The influence of such variables as spring stiffness and damping may be considered for the aid of an example, here a 100-ton Co-Co diesel or electric locomotive with the body weighing 56 tons and the sprung portion of each bogie weighing 10 tons. The total static spring deflection shall be 6·5 in., and of this, 5 in. or 3·5 in. shall be claimed by the bolster suspension. Alternatively, the total deflection is assumed to 4·5 in., of which 2·5 in. and 1·5 in. are allocated to the bolster.

The equation (12, 14) used for the determination of the dynamic deflection of the primary springs due to bouncing is given in Fig. 5, together with the results of calculations for six cases of damping factors. The values of $D_1 = 0{\cdot}1$ relate to helical springs, while $D_1 = 0{\cdot}4$ is more representative of laminated springs or well-damped helical springs.

In most instances, cases 2 and 5 are fairly representative. The curves (Fig. 5) are plotted in terms of the absolute transmissibility (magnification factor) as a function of excitation frequency f. The former is the ratio of spring deflection divided by the height of the obstacle or the transmitted force divided by the force of excitation. The

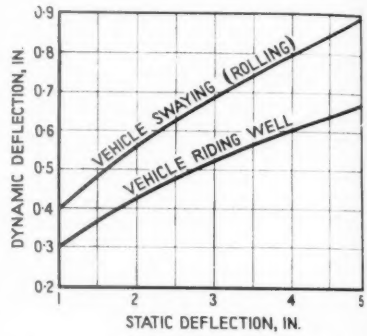


Fig. 4—Dynamic deflection as a function of static deflection

frequency can be related to the vehicle speed and 60-ft. rails, assuming excitation at 30-ft. intervals. In this case, 100 m.p.h. is equivalent to 4·88 cycles per sec.

When comparing the curves (Fig 5), it should be noted that due allowance must be made for the stiffness of the primary springs. Thus, with 3-in. static deflection, the springs will be twice as soft as with 1·5 in. At 50 and 100 m.p.h., the absolute transmissibility for the case 5 is 0·24 and 0·73, and 0·95 and 1·18 respectively.

In terms of additional dynamic loads imposed by the wheels, these values relate as 0·16 to 0·243, and 0·633 to 0·415 respectively. With the static deflection of the bolster springs of 2·5 in. and 1·5 in. and that of the primary springs of 2 in. and 3 in., respectively, the absolute magnification values for the case 5 at 50 and 100 m.p.h. are 0·75 and 1·35 and 0·95 and 1·18 respectively. In terms of additional dynamic loads these values relate as 0·377 and 0·45 and 0·475 and 0·394 respectively.

It readily will be appreciated that, apart from purely mechanical considerations, these results suggest that the choice of optimum spring parameters also must be governed by the speeds most likely to be called for by operational considerations. These

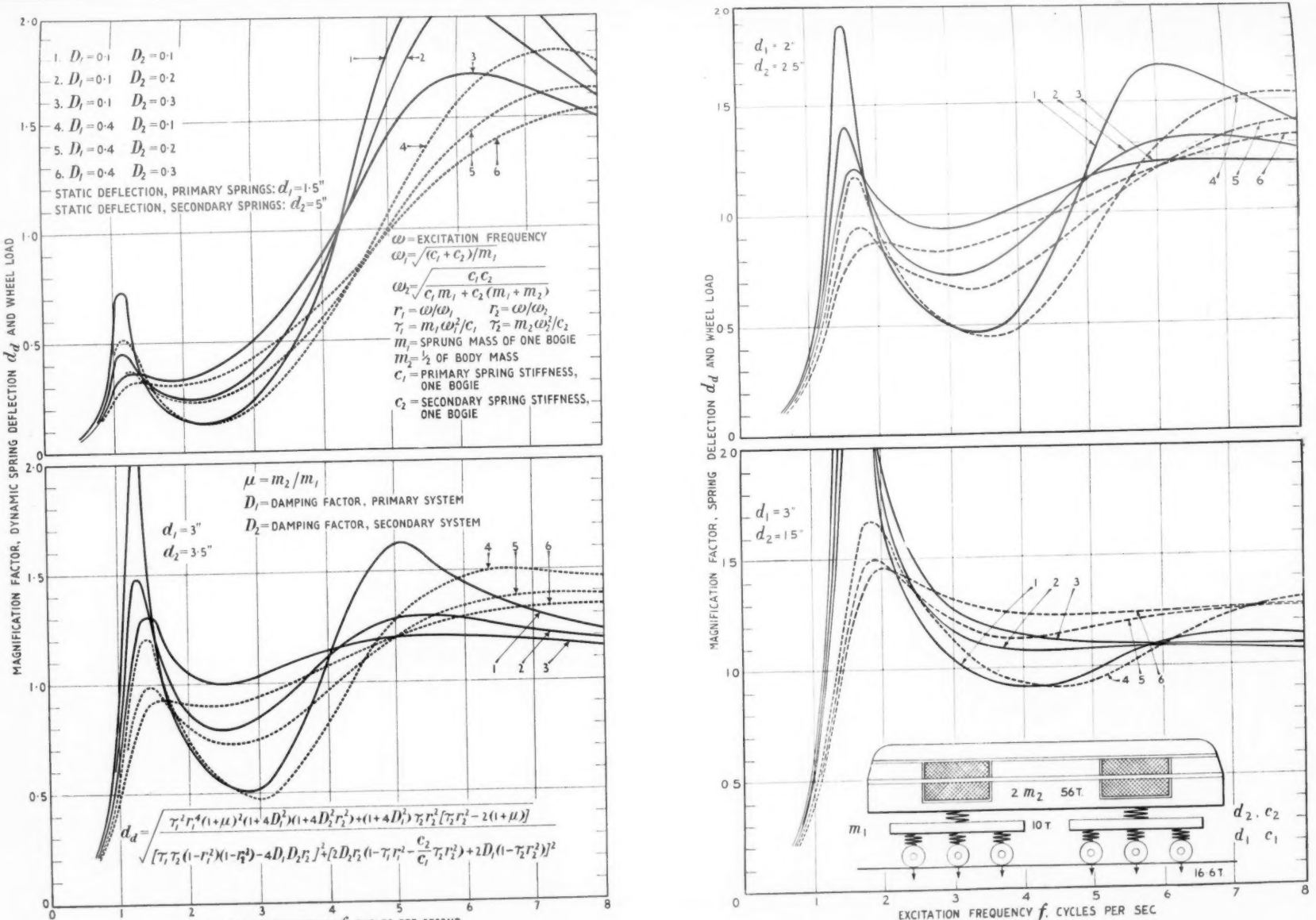


Fig. 5—Dynamic deflection of primary springs as affected by spring stiffness and damping forces, 100-ton Co-Co locomotive

should be known with reasonable certainty at the design stage.

Another important consideration relates to the riding quality of the vehicle as imposed on passengers, crew, or equipment. These results show the importance of careful spring and damper proportioning as far as spring deflections and dynamic wheel-loads due to sprung masses and body accelerations are concerned. In the case of locomotives, the former should receive very careful attention, while in the case of passenger vehicles, the latter considerations might well be of overriding importance. In any case, both aspects should be borne in mind with the aim to achieve an optimum solution.

It is instructive to compare the curves (Fig. 5) with experimentally-obtained data relating to carriage bogies published elsewhere (13), and to observe basic similarity between the two sets of results. It must be stressed that these considerations apply solely to vertical oscillations of the sprung masses carried by springs with linear characteristics. As far as suspension design is concerned, careful consideration also must be devoted to other modes of oscillation such as pitching and swaying (7).

With some types of quill drives used with fully-sprung motors of electric locomotives, the vertical component of the quill-spring forces can have an appreciable effect on the stiffness of the primary springs (7). This in turn affects the spring deflection as a function of vehicle speed.

As an example, consider an 80-ton Bo-Bo locomotive. The body weight shall be 46 tons and the sprung portion of each bogie, including the fully-sprung motors, shall weigh 12 tons. Each motor of this type is likely to weigh 4 to 4·5 tons and, when axle-hung, some 60 per cent of this value will be carried directly by the axles. The static deflection is assumed at $2\frac{3}{8}$ in. and $3\frac{5}{8}$ in. for the primary and secondary suspension, respectively, but the presence of the spring quill drive will, in this case, increase the primary spring stiffness of each bogie from 14·8 tons per in. to 28·8 tons per in. The results of the calculations are plotted in Fig. 6. Here, for case 4 at 50 and 100 m.p.h., the absolute transmissability is 0·2 and 0·22, and 1·42 and 1 for the axle-hung and fully-sprung motors, respectively. In terms of dynamic loads arising from sprung masses, these values relate as 0·2 and 0·43, and 1·42 and 1·95 respectively.

It is scarcely necessary to mention that these considerations relate solely to the action of sprung masses, and do not take into account the benefits possibly derived from the effective reduction of the unsprung masses due to the use of fully-sprung motors, or the reduction of armature inertia forces due to torsionally-resilient drives.

Conclusions

In the light of fatigue considerations, spring dimensions should be based on the dynamic stresses imposed in service. The resultant prevailing maximum deflections should not result in dynamic stresses exceeding about 10 tons per sq. in. if ground helical Si Mn springs are used. The dynamic deflection of the springs in service will depend, apart from track conditions, on the static deflection, *i.e.*, spring stiffness, of the primary and secondary springs, and the masses of bogies and body as well as on the damping factors ensured by the dampers provided across the springs, and the damping "built in" in the suspension.

As the dynamic deflection of the primary springs is equivalent to the dynamic load imposed on the rails at the joints by the sprung portions of the vehicle, it also is of obvious importance, as far as the vertical accelerations of the vehicle are concerned, to keep the dynamic deflection in the operating range within limits ensuring optimum vehicle and spring performance. While with locomotives the suspension should keep low the dynamic loads imposed in addition to the usually heavy static loads, with passenger-carrying vehicles, accelerations imposed on the body will be of greater importance, but here, too, dynamic

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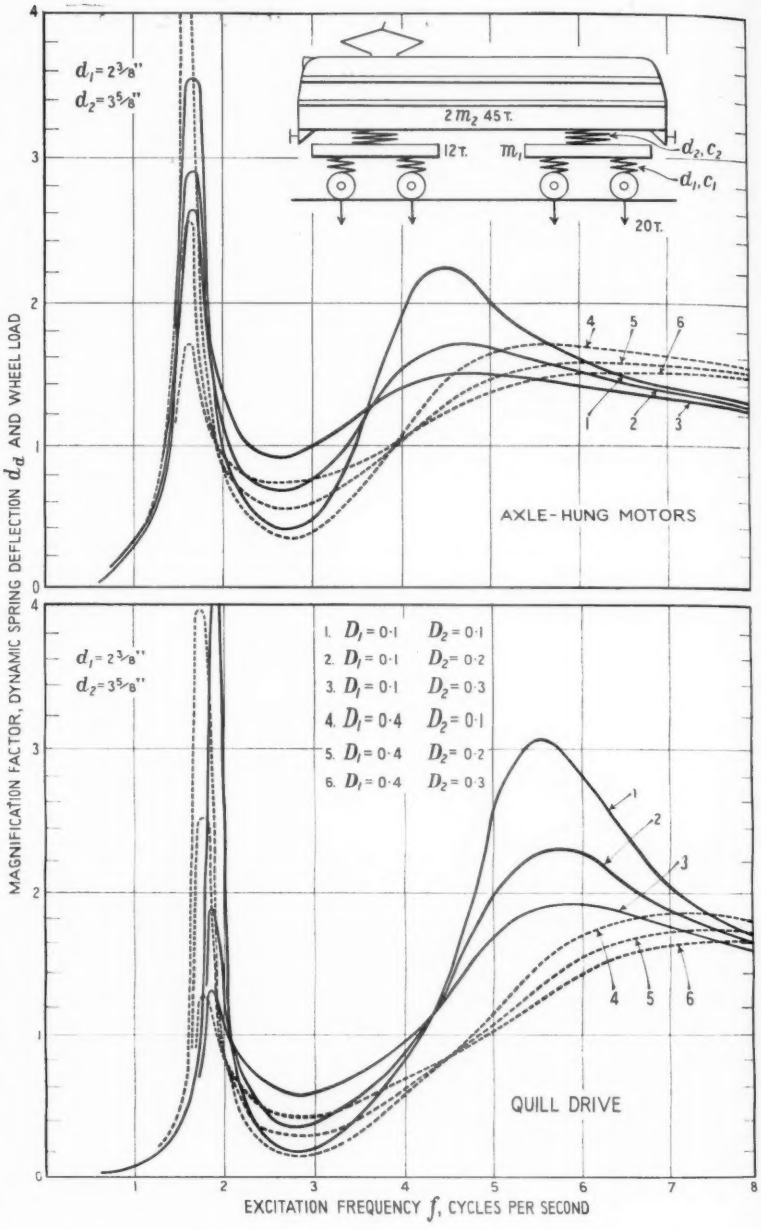


Fig. 6—Dynamic deflection of primary springs, 80-ton Bo-Bo electric locomotive with axle-hung motors or quill drive

All-Timber Railcar Shed at Bristol, Western Region

Laminated arches and plywood box beams to reduce weight on soil with poor load-bearing capacity

INSPECTION of the site for a diesel railcar maintenance shed at Bristol Marsh Lane, British Railways, Western Region, showed the load-bearing capacity of the soil to be very poor. Most of the area concerned is made-up ground. It was accordingly decided to use timber.

The shed accommodates four three-car diesel trains. The overall length is 243 ft. and width 114 ft. The width is broken into two spans of approximately 57 ft. Laminated arches were required for this span, to be spaced at 20-ft. centres along the building, the height at the apex being 30 ft. There are inspection pits beneath each of the four tracks.

Design Stresses

In the light of recent research work on permissible stresses for laminated timber, a waiver to the recommended Code figure of 1,000 lb. per sq. in. was granted by the British Transport Commission. This enabled design stresses 40 per cent in excess of this figure to be used.

The waiver was on the condition that the outer two laminates were specially selected and contained 50 per cent less faults than those allowed by B.S. 1860: "Structural softwood. Measurement of characteristics affecting strength."

All other structural timber work was designed in accordance with the recommendations laid down in CP 112 (1952): "The Structural Use of Timber in Buildings" with the loading assumption in conformity with the requirements of CP 3, Chapter V: "Loading." A feature of the design was that each arch had to act independently so as to avoid transference of stress should differential settlement occur.

Fabrication of Arches

The arches, of Group I timber, were fabricated on a horizontal laminated bed. Each ¾-in. laminate was carefully selected and pre-scarfed before the dry lay up, gluing and cramping followed in the normal way. The whole component was subject to the usual curing process for the required length of time, the temperature in the glue line being raised to 100° F. The glue used was Cascophen resorcinol resin.

At the end of the curing period the arches were machined to size using Tarplaner portable electric planing machines.

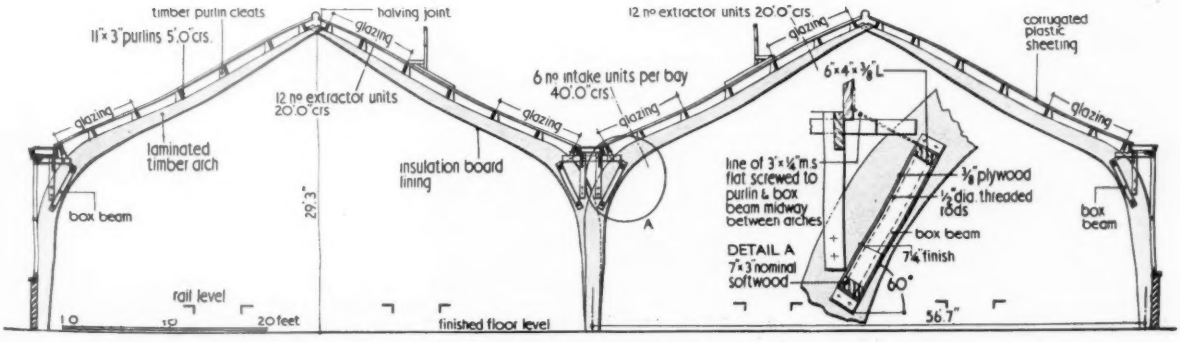
Treatment of Timber

Treatment of the arches consisted of brush coatings of Cuprinol W.R. clear insecticidal solution and Dohm fire retardant solution, followed by a coat of primer. All other timber was pressure-treated with Celcure F before despatch to site. Transport to site presented no difficulty and the arches were erected with the minimum of mechanical handling apparatus.

Box Beams

A novel form of longitudinal bracing to the arches was given by using plywood box beams inclined at an angle of approximately 60 deg. to the horizontal and supported on mild steel angles bolted to the arches. These box beams have an overall depth of

General view, showing wind bracing in the plane of the purlins in the first bay



Details of construction. Note longitudinal bracing of arches by plywood box beams

Cutter brackets fixed independently to each arch to avoid transference of stress should differential settlement occur

4 ft. and are 7¼ in. wide, the webs being ⅜ in. thick Douglas fir plywood G.I.S. glued and pinned to the 3 in. × 7 in. (nominal) top and bottom chords.

Bracing

The bracing in the plane of the purlins follows standard engineering procedure, with the addition of 6 in. × 4 in. oblique struts from the purlins down to the box beams that span the two openings at one end of the building.

The function of these oblique struts is to resist wind pressure on the end framing at the mid point of the bay. The actual bracing members themselves were of 2 in. × 9 in. cross section with a 1 in. × 6 in. laid flat, glued and screwed to the top edge, giving restraint to the 2 in. × 9 in. about its weaker axis.

The 1-ft. 9-in. deep plywood box beams over the openings in the end bay are designed to carry roller shutters besides the self weight of the triangular portion of the framing above.

Side Framing

The side framing is seated on a 2 in. × 5 in. cill plate, rag bolted to a concrete cill laid on a 9-in. dwarf wall, and is designed to withstand a 72-m.p.h. wind velocity, as the site of this building is in a relatively exposed position.

The building was designed by Mr. M. G. R. Smith, M.I.C.E., Chief Civil Engineer of the Region, and the structural timber work by Mr. D. H. Moss, A.M.I.Struct.E.

The laminated arches and plywood box beams were fabricated by Laminated Wood Limited. Erection and other timber work was by Bartlett Materials Handling Limited. The main contractors were Kyle Stewart (Contractors) Limited.

Acknowledgment is made to our associated monthly journal *Wood* for use of the information and illustrations reproduced in this article.

Interior of one of the 56 ft. 7 in. bays. A 2 in. × 9 in. bracing member with a 1 ft. × 6 in. member laid flat, glued, and screwed to the top edge can be seen in the top right-hand corner

Spring Stresses and Deflections

(*Concluded from page* 130)

action at the rails must not be overlooked.

Acknowledgment is made to the Director of Research, British Railways, for permission to publish this article.

REFERENCES

[1] Gross, S., and Lehr, E., "Die Federn," VDI-Verlag, Berlin, 1938.
[2] Bensinger, W. D., "Die Steuerung des Gaswechsels in Schnellaufenden Verbrennungamotoren," Springer-Verlag, Berlin, 1955.
[3] Noll, G. C., and Lipson, C., "Allowable Working Stresses," *Proc. Society for Experimental Stress Analysis*, Vol. III, No. 2, New York, 1946.
[4] Coates, R. C., and Pope, J. A., "Fatigue Testing of Compression-Type Coil Springs," Institution of Mechanical Engineers, *Proceedings*, International Conference on Fatigue of Metals, 1956.
[5] Koffman, J. L., "Light Railcars for Colonial Railways," *Bulletin of the International Railway Congress Association*, July, 1947; Koffman, J. L., "Railcar Bolster Suspension," *Diesel Railway Traction*, June, 1950.
[6] Haringx, J. A., "On Highly Compressible Helical Springs and Rubber Rods and their Application for Vibration-Free Mountings," Philips Electrical Company, 1949; Borgeaud, G., "Zylindrische Schraubenfedern bei nicht rein zentrischer Belastung," Mirko Res Commemorative Volume, Vogt-Schild A.G., Solothurn; Chernischev, N. A., "Stability of Compression Springs (in Russian), volume on "New Methods of Spring Calculations," Mashgis, Moscow, 1946; Shadur, L. A., "Investigations Concerning Stresses in Bolster Beams" (in Russian), volume on "Investigations of Strength of Principal Wagon Components," Transsheldorisdat, Moscow, 1957.
[7] Koffman, J. L., "Vibrational Aspects of Bogie Design," *Journal Institution of Locomotive Engineers*, Vol. 47 (1957), Part 6.
[8] Sperling, E., "Neuere Erkenntnisse über den Lauf von Eisenbahnwagen," *Archiv für Eisenbahntechnik*, August, 1956.
[9] Krepkogorsky, S. S., "Vertical Oscillations of the Rolling Stock and its Effect on the Permanent Way" (in Russian), Transsheldorisdat, Moscow, 1958.
[10] Cox, E. S., "Approach to Modernisation," *Journal, Institution of Locomotive Engineers*, vol. 47 (1957), Part 4.
[11] Koffman, J. L., "Vibration Damping in Railcars," *Diesel Railway Traction*, Dec., 1955.
[12] Matsudaira, T., *et al*, "Forced Vertical Vibration of Bogie Car with Oil-Damper applied to Bolster Springs," *Journal of Railway Engineering Research*, Tokyo, Feb., 1952.
[13] Sperling, E., and Polak, A., "Schwingversuche zur Klärung des Günstigsten Federungsverhältnisses an Minden-Deutz Drehgestellen," E.T.R., Nov., 1956; Sperling, E., and Betzhold, "Über ausgeführte Schwingungs-und Festigkeitsversuche an Eisenbahnfahrzeugen," *Glasers Annalen*, Aug., 1958.
[14] Marquardt, E., "Untersuchungen über den Einfluss der Stossdämpfer auf die zwischen Rad und Fahrbahn auftretenden senkrechten dynamischen Bodenkräfte," *Deutsche Kraftfahrtforschung und Strassenverkehrstechnik*, 1957, No. 104; Mitschke, M., "Schwingungsverhalten und Sicherheit eines Kraftfahrzeuges," *ATZ*, Vol. 60, No. 6 (June, 1958); Mitschke, M., "Luftfederung, ihre schwingungstechnischen Vorteile und ihre Forderungen an die Dämpfung," *ATZ*, Vol. 60, No. 10 (Oct., 1958).

INSTITUTION OF LOCOMOTIVE ENGINEERS' FILM SHOW.—At an informal meeting of the Institution of Locomotive Engineers this week, four films were shown. The first, "Third River," was a half-hour documentary by Petroleum Films Bureau telling the story of the 30-in. pipeline across Iraq to the Mediterranean. This was followed by a short colour film describing the basic function of the thermal reactor for Calder Hall atomic power station, and a film showing the construction and erection of the 180-ton Babcock & Wilcox heat exchanger shells for Calder Hall. The fourth film, presented by Pilkington Bros., was concerned with various aspects of glass.

RAILWAY NEWS SECTION

PERSONAL

Mr. Brian Gray, Divisional Traffic Manager, Barrow, London Midland Region, British Railways, will act as Divisional Traffic Manager, East Midlands, during the illness of Mr. T. P. Strafford.

Mr. Chan Peng Khuen, who, as recorded in our September 26 issue, has been appointed Acting Chief Mechanical Engineer, Malayan Railway, trained as a technical apprentice at Sentul Works, and was appointed Technical Assistant in 1947. He was later awarded a scholarship and received further training in Derby Locomotive Works, London Midland & Scottish Railway, from 1947 to 1949. He returned to Malaya, in 1950, as Mechanical Engineer in charge of the Drawing Office. In 1952 he became Senior Assistant Locomotive Superintendent, and was appointed Locomotive Running Superintendent in May, 1957. Mr. Chan Peng Khuen assumed the duty of Chief Mechanical Engineer last May.

Mr. Chan Peng Khuen

Appointed Acting Chief Mechanical Engineer, Malayan Railway

Mr. T. A. Hooker, Industrial Agent, London, Canadian National Railways, has been appointed Development & Research Officer.

A memorial service for Mr. Henry Oswald, late Managing Director of British Brown-Boveri Limited, will be held at the Swiss Church, 79, Endell Street, London, W.C.2, on Monday, February 2, at noon.

Mr. T. R. Hawkes, M.Inst.T., Regional Accountant, Eastern and North Eastern Regions, British Railways, who, as recorded in our January 9 issue, has retired, began his railway career in the Locomotive Accountant's Department, Great Eastern Railway, in 1910. He served with the Royal Engineers during the 1914-18 war. Later he was associated with the Ministry of Transport investigation of the Great Eastern Railway's arrears of maintenance claims. Following amalgamation, he took part in the valuation of L.N.E.R. rolling stock for standard revenue purposes. In 1927 he took up a special appointment in the Chief Accountant's Office, L.N.E.R., and was responsible for the expansion and development of mechanisation throughout the department. After a period as Statistical & Staff Assistant to the Chief Mechanical Engineer, he was appointed Locomotive Accountant (Scottish Area), Cowlairs, in 1939. While holding this position he became Deputy Commander, 8th City of Glasgow Battalion, Home Guard. He was appointed Assistant to the Chief Accountant, in 1942, and Senior Assistant in 1947. On nationalisation, in 1948, Mr. Hawkes became Assistant Accountant, Eastern and North Eastern Regions. He was appointed Regional Accountant, Eastern and North Eastern Regions, in 1950. He was a Director of Northern General Transport Co. Ltd., Associated Humber Lines Limited, Wilsons & North Eastern Railway Shipping Co. Ltd. and Société Belgo-Anglaise des Ferry Boats, and a member of the Sheffield, Halifax & Huddersfield Joint Omnibus Committees.

Mr. T. R. Hawkes

Regional Accountant, Eastern and North Eastern Regions, 1950-58

Mr. F. C. Asgill, Vice-Chairman of Stevenson Clarke Limited, has been elected an additional member of the Finance & Establishment Committee of the Institute of Transport.

Dr. F. E. Jones, a director of Mullard Limited, has been made a member of the Research Advisory Council, British Transport Commission.

Order of St. John of Jerusalem

Mr. H. A. Short, General Manager, North Eastern Region, British Railways, and President of the North Eastern Region Ambulance Centre, has been promoted in the Order of St. John of Jerusalem to the Grade of Commander Brother. Mr. W. B. Webb, Carriage & Wagon Department, York, North Eastern Region, is promoted from Serving Brother to Officer Brother of the Order. The following become Serving Brothers: Mr. H. Ingham, Traffic Department, Huddersfield; Mr. J. H. Elders, Carriage & Wagon Department, Shildon; Mr. H. Selway, Motive Power Department, Holbeck, Leeds; Mr. E. R. Hodgson, Traffic Department, Huddersfield.

Colonel J. R. H. Robertson

Appointed Inspecting Officer of Railways, Ministry of Transport & Civil Aviation

Mr. A. G. Dawson

Appointed Assistant Regional Accountant, Eastern Region

Mr. J. S. Scott

Appointed Works Manager, Locomotive Works, Darlington, N.E. Region

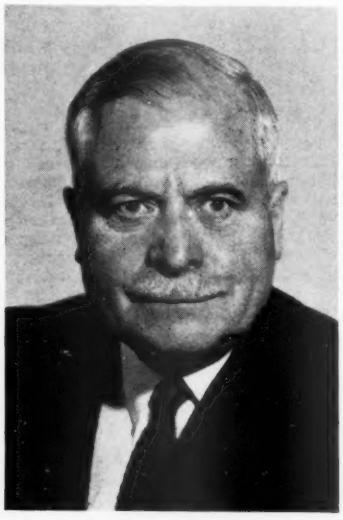
Colonel J. R. H. Robertson, O.B.E., who, as recorded in our January 9 issue, has been appointed an Inspecting Officer of Railways, Ministry of Transport & Civil Aviation, is 46. Colonel Robertson was educated at Wellington College, the Royal Military Academy, Woolwich, and Cambridge University, where he gained an honours degree in the Mechanical Sciences Tripos. He was commissioned in the Royal Engineers, in 1932, and attended a railway course at the Railway Training Centre, Longmoor, from 1935 to 1938. The course included attachment, for a year, to the North Eastern Division of the London & North Eastern Railway. On the outbreak of the 1939-45 war, he served in France and Norway. Later he commanded the Transportation Wing, Combined Training Centre, Inverary. Since the war he has held various staff appointments, including those of Chief Instructor, Transportation Training Centre, 1946, and Chief Instructor, School of Military Engineering, 1954-56. In 1952-53 he commanded the Middle East Transportation Regiment, R.E., in Egypt. He has retired from the Army to take up his new appointment.

Mr. A. G. Dawson, Treasurer, Eastern and North Eastern Regions, British Railways, who, as recorded in our January 9 issue, has been appointed Assistant Regional Accountant, Eastern Region, joined the former South Eastern & Chatham Railway in 1919. On amalgamation, in 1923, Mr. Dawson. was transferred to the Secretary's Office, Southern Railway. After serving with the R.A.F. during the 1939-45 war, as a fighter controller, he became Clerk to the Southern Railway's Finance Committee. In 1947 he was appointed Assistant Treasurer, Southern Railway and, in 1951, he became Treasurer, Eastern and North Eastern Regions, British Railways, the position he now vacates. Mr. Dawson is a Chartered Secretary.

Mr. J. S. Scott, M.I.Mech.E., M.I.Loco.E., Works Manager, Gorton Locomotive Works, North Eastern Region, British Railways, who, as recorded in our January 23 issue, has been appointed Works Manager, Darlington Locomotive Works, received his early technical training with the former Caledonian Railway, at St. Rollox Works, and at the Royal College of Science & Technology, Glasgow. In 1939, he was appointed Works Superintendent, Barassie Wagon Works, and during the 1939-45 war, was engaged on a Spitfire repair organisation at the works. He was Works Manager, Cowlairs Locomotive Works, from 1948 to 1951 when he became

Mr. Hubert H. Scott

Passenger Traffic Manager, Steamship Services, C.P.R., 1953-58



Mr. E. F. Thompson

Appointed Passenger Traffic Manager, Steamship Services, C.P.R.

Mr. B. Bouzan

Chief of Investigation Department, C.P.R., 1954-1958

Acting Locomotive Works Manager, Doncaster. In 1952 Mr. Scott was appointed Locomotive Works Manager, Gorton.

Mr. Hubert H. Scott, Passenger Traffic Manager, Steamship Services, Canadian Pacific Railway Company, who, as recorded in our January 2 issue, has retired, joined the Passenger Department, Canadian Pacific Railway, as a stenographer in 1912. Appointed Secretary to the Vice-President of Traffic in 1918, Mr. Scott continued to serve in that office as Assistant Chief Clerk, 1919-21; Chief Clerk, 1921-45, and as Assistant to the Vice-President, Traffic, 1945-1953. He was appointed Assistant Steamship Passenger Traffic Manager, in 1953, and Steamship Passenger Traffic Manager in 1954. Mr. Scott was Vice-President of the Railway-Telephone Hockey league, Montreal, from 1923 to 1931, and is a member of the Skal Club, Canadian Railway Club and Montreal Traffic Club.

Mr. Eric F. Thompson, Assistant Passenger Manager, Steamship Services, Canadian Pacific Railway Company, who, as recorded in our January 2 issue, has been appointed Passenger Traffic Manager, Steamship Services, joined the Canadian Pacific Railway in Toronto in 1919, and became Assistant General Agent, Toronto, in 1928. Mr. Thompson took up temporary duty in the company's Paris office in 1930. He later returned to Toronto and was appointed Steamship General Agent there in 1936. He moved to Montreal in 1950, and became Assistant Steamship Passenger Traffic Manager in 1954.

Mr. Ben Bouzan, Chief of Investigation Department, Canadian Pacific Railway, who, as recorded in our January 2 issue has retired, was educated at the High School, Haileybury, Ontario. During the 1914-18 war, Mr. Bouzan served overseas with the Canadian Grenadier Guards and the 1st Battalion Canadian Railway Troops. He joined the Investigation Department of the C.P.R. as a constable in 1920. He was appointed Investigator, in 1923, and, in 1939, took charge of the Quebec District. Mr. Bouzan was in charge of the Ontario District at Toronto in 1943 and, from 1944 to 1954, when he was appointed Chief of the Department in Montreal. Elected President of the Canadian Association of Chiefs of Police in September, 1957, Mr. Bouzan is also a member of the International Association of Chiefs of Police, the Protective Section, American Association of Railroads, and the Province of Quebec Police & Fire Chiefs' Association. He is an Officer Brother of the Most Venerable Order of the Hospital of St. John of Jerusalem. During the 1939-45 war, Mr. Bouzan was control officer for the Canadian Pacific Railway's Civilian Protection Committee.

Mr. L. E. Carr, Manager, Export Distribution, Cummings Engine Company Incorporated, has been appointed Resident Manager of Cummings Diesel International Limited, Nassau, Bahama. This newly-formed company was referred to in our issue of January 16.

Mr. H. Annis, Chief Inspector, Metropolitan-Vickers Electrical Co. Ltd., has retired. He has been succeeded by Mr. A. D. Jacklin, Assistant Chief Inspector. Mr. W. H. Brodie, Chief Inspector (Larne) becomes Assistant Chief Inspector, Trafford Park.

Mr. R. A. Bent, Managing Director of Lancashire Dynamo Products Limited, has been appointed to the board of Lancashire Dynamo Holdings Limited.

Mr. J. M. Williams has been appointed an associate Director of Holman Brothers Limited, and has moved from Camborne to take up the position of London Director.

Mr. J. W. Lee has been appointed Sales Manager of Fluidrive Limited. Mr. A. W. R. Willis becomes Chief Application Engineer (Motors), and Mr. R. V. Adams, Chief Application Engineer (Engines).

Mr. Hugh D. Binyon, Instrument Sales Director, Solartron Electronic Group, Limited, is visiting New Delhi to attend the Indian Science Congress and to be present at the stand of the group at the exhibition held in association with the Congress.

Institution of Railway Signal Engineers

The following names have been entered on or transferred in the register of members of the Institution of Railway Signal Engineers:—

Member

Mr. S. C. Banerjee, Assistant Signal & Telecommunication Engineer (Construction), Bombay, Central Railway, India.

Associates

Mr. R. A. Curtis, Liaison Engineer (Railways), Home Sales Department, Manchester, W. T. Glover & Co. Ltd.

Mr. J. Hallett, Technical Clerk, Siemens & General Electric Railway Signal Co. Ltd.

Mr. R. E. H. Pew, Liaison Executive, Plessey Co. Ltd.

Associate Member to Member

Mr. A. Cardani, Assistant Signal Engineer, Reading, Western Region, British Railways.

The Late Mr. J. W. Watkins

In addition to family mourners, the following were among those who attended the Memorial service, referred to in our last week's issue, to the late Mr. J. W. Watkins:—

Ministry of Transport and Civil Aviation.

Mr. T. J. Dunnett, Mr. R. R. Goodison, Brigadier C. A. Langley.

British Transport Commission

Sir Brian Robertson, Sir John Benstead, Sir Ian Bolton, Colonel D. H. Cameron of Lochiel, Mr. R. F. Hanks, Mr. J. Ratter, Lord Rusholme, Mr. T. H. Summerson, Mr. A. B. B. Valentine, Sir Philip Warter, Sir Cecil Weir, Sir Reginald Wilson, Sir Michael Barrington-Ward (retired), Sir J. Landale Train (retired).

Sir Robert Letch, Major-General Ll. Wansborough-Jones, Messrs. D. S. M. Barrie, J. H. Brebner, S. B. Taylor, M. H. B. Gilmour, T. H. Hollingsworth, A. R. Dunbar, J. O'Neill, F. Grundy, D. Murray, J. L. Harrington, C. W. Roundell, Sir Reginald Kerr, Messrs. M. A. Cameron, J. A. Broughall, W. L. Ives (also representing B.T.C. Yacht Club), T. V. Nicholson, A. H. J. Turner, C. E. R. Sherrington, R. B. Hoff, L. B. Marson, E. A. W. Dickson, J. L. Webster (also representing the Railway Convalescent Homes), C. H. Brazier, Major-General G. N. Russell, Messrs. F. Gilbert (retired), R. A. Riddles (retired), Sir Reginald Biddle (retired), Mr. G. Morton (retired).

London Transport Executive

Sir John Elliot, Messrs. A. Herbert Grainger, L. C. Hawkins.

London Midland Region

Messrs. J. Haworth, M. T. Howard Williams, David Blee, E. W. Arkle, A. J. Pearson, L. W. Cox, L. A. Metcalfe, J. K. Bryant, T. Fiske, C. Lakin (representing Mr. E. S. Hunt—retired).

Messrs. George Dow, M. G. E. Lambert, R. L. E. Lawrence, J. Royston, A. H. Madden (representing Mr. T. P. Strafford), A. J. Johnson, S. H. Gould, E. H. Baker, L. D. Taylor, E. W. E. Preece (representing Mr. F. Marsden), G. J. Harris, H. Aidley, J. G. Norton, H. Randle (also representing Mr. A. E. Robson), P. J. Fisher, J. Greenwood, J. C. Rogers, E. G. Brentnall, A. E. C. Dent, A. B. Macleod, J. B. Chadwick (representing Mr. J. K. Abson), Dr. G. E. Graves Pierce.

Messrs. R. W. Crawshaw, J. W. Tonge, W. N. Roberts, T. Neal, D. M. Howes, A. F. Fielding, J. L. O'Connell, G. J. Aston, A. T. Salmon, A. Jones, H. S. Turrell, S. T. Clayton (retired), F. W. Abraham (retired), E. H. Garfield (retired), A. E. Hammett (retired).

Eastern Region

Messrs. H. C. Johnson, S. G. Hearn, A. J. White, G. W. Dedman.

North Eastern Region

Mr. H. A. Short.

Scottish Region

Mr. J. Ness.

Southern Region

Messrs. C. P. Hopkins, C. H. Jones (also representing Mr. F. W. Burton).

Western Region

Messrs. K. W. C. Grand, H. G. Bowles, J. R. Hammond, C. J. Rider, Sir Allan Quartermain (retired).

Canadian Pacific Railway Company

Mr. H. Arkle.

Rhodesia Railways

Mr. O. S. Naylor.

Pullman Car Company

Mr. E. J. Morris.

Also present

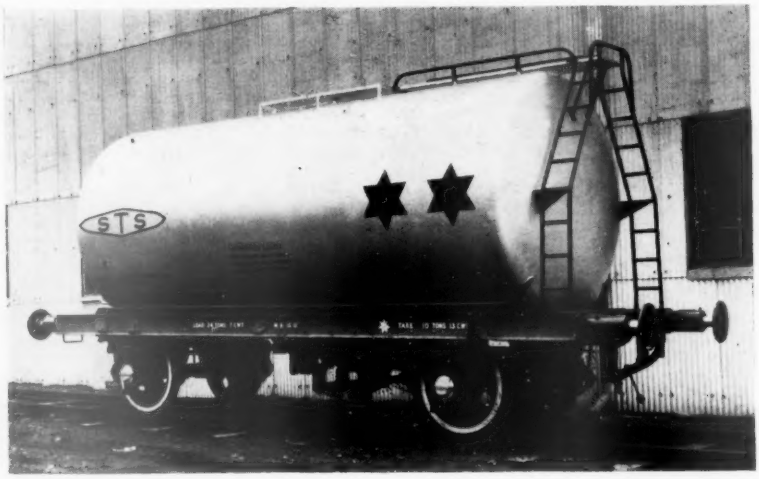
Sir John Charrington (Charrington, Gardner & Locket & Co. Ltd.) Mr. C. H. Cowtan (Railway Benevolent Institution), Mr. J. Latham (National Coal Board), Mr. R. Arbuthnott (Institution of Locomotive Engineers), Mr. Alexander Young (General Steam Navigation Co. Ltd.) with Mr. A. J. Hailstone, Mr. F. L. Castle (Siemens & General Electric Railway Signal Co. Ltd.), Mr. J. McN. Sidey (Anglo-Overseas Transport Co. Ltd.), Mr. H. W. Ellis (Port of London Authority), Mr. J. S. Bevan (Union-Castle Mail Steamship Co. Ltd.).

Mr. Alexander Dowie (G. D. Peters & Co. Ltd.), Wing Commander J. M. Aiton (Aiton & Co. Ltd.), with Mr. E. G. Boissier and Major G. R. H. Trollope, Captain V. G. Smith (President, 1/5th Battalion, the Gloucestershire Regiment Old Comrades' Association) with Mr. K. A. Robinson, Mr. H. N. Edwards (Metropolitan-Cammell Carriage & Wagon Co. Ltd.), with Mr. L. B. Alexander.

Mr. G. R. Curry (Locomotive & Allied Manufacturers' Association of Great Britain), Mr. H. A. A. While (United Steel Companies), Mr. J. S. Baillie (Harland & Wolff Limited), Mr. D. F. Martin-Jenkins (Shipping & International Services Sub-Commission of British Transport Commission & Ellerman Lines Ltd.), Mr. P. H. McCormack (director, Provident Mutual Life Assurance Association) with Mr. C. E. Johns, Mr. J. D. K. Marshall (William Denny & Bros. Ltd.), Mr. George Henderson (Derbyshire Stone Limited).

Mr. J. McF. Neill (Belfast Harbour Commissioners), Mr. G. W. Todd and Mr. L. A. Potter (Shell-Mex & B.P. Limited), Air Commodore W. Wynter Morgan, Colonel E. Woodhouse, Colonel G. McMullen, Colonel G. F. Page (representing The Lancashire Fusiliers), Mr. J. Laing (Central Electricity Generating Board), Mr. R. J. Gunter (Transport & Salaried Staffs' Association), Mr. S. F. Greene (National Union of Railwaymen), Mr. B. W. C. Cooke (*The Railway Gazette*).

NEW EQUIPMENT AND PROCESSES



New Tank Wagons

LIGHTER tare weight, improved tank capacity, and high payloads are claimed from the method of construction of two prototype tank wagons now being built to run on British Railways.

The tanks are permanently attached along their entire length by welding to chassis frames, so forming one load-bearing unit. Cross-members are dropped below solebar height and shaped to support an arc of the tank circumference. This feature, shown in the end elevation drawing on this page, lowers the centre of gravity and enables a large-diameter tank with fittings to comply with loading-gauge requirements. The elimination of a main-frame top-plate further reduces weight.

The first of the two prototypes is a Class "A" tank wagon with top outlet and 4-in. dip-pipe. It should be suitable for liquids having a flashpoint below 73 deg. F.

Leading particulars are as follow: gauge 4 ft. 8 in., wheelbase 15 ft., length over buffers 28 ft. 2 in., overall height from rail 12 ft. 5 in., outside tank dia. 8 ft. 5 in., tank length 22 ft. 2⅛ in., tare weight of wagon 10 ton 13 cwt., maximum payload 24 ton 7 cwt.

The tank is of all-welded steel with horizontal internal cross-stays. Capacity is 6,940 gal. (4 per cent ullage). Equipment includes an end-mounted ladder with catwalk, Skefko roller-bearing axleboxes, Dowty high-capacity hydraulic buffers, screw couplings, and vacuum-operated brakes with 18-in. dia. main cylinder and 21-in. assisting cylinder. Exterior finish is silver and red.

The second prototype conforms with Class "B." Steam-heating coils and duplicate bottom-outlet connections involve additional weight and necessitate a smaller tank size with correspondingly reduced payload. Leading particulars are as follow: inside tank diameter 7 ft. 10½ in., tank length 21 ft. 10¼ in., tare weight of wagon 11 ton 4 cwt., maximum payload 23 ton 16 cwt.

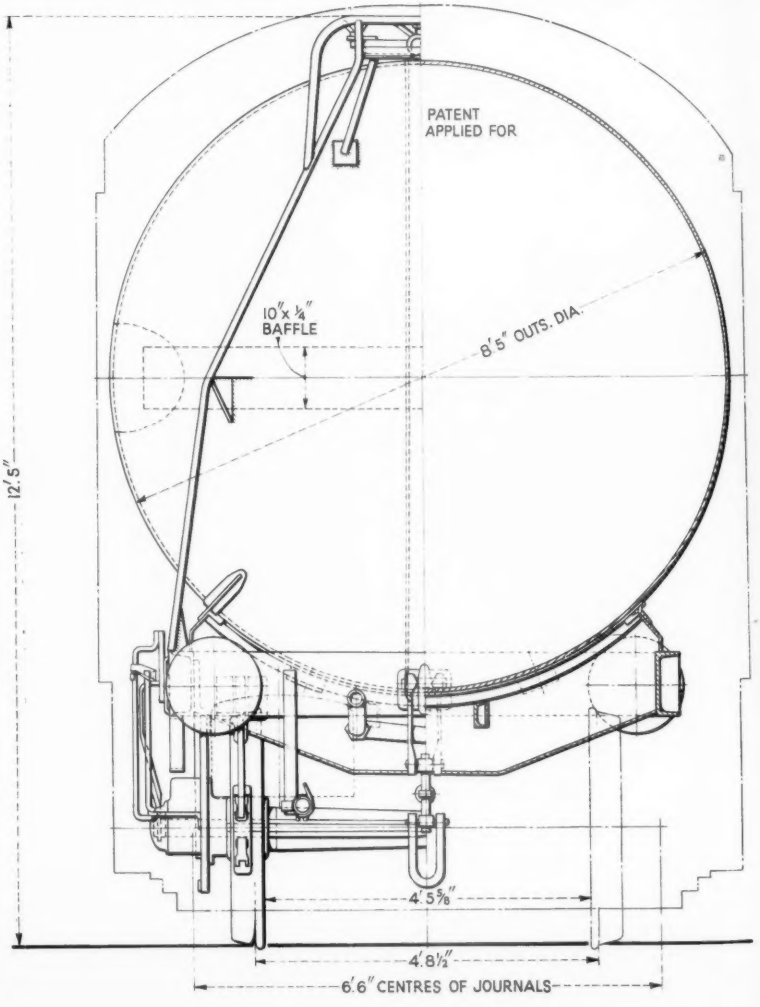
Gauge, wheelbase, length, height, and running-gear approximate those of the first wagon except that the ladders giving access to the outlet screw-down gear are rigged to the tank sides. Two hoops of "I"-section mild steel welded to the outside of the tank provide stiffening. Useful capacity is 5,952 gal. against 5,155 gal. net capacity of the Class "B" wagon of conventional design. Exterior finish is all-black.

These two wagons are the British-built equivalent of vehicles already in use on the Continent. Manufacture is by M. & W. Grazebrook Limited, Dudley, Worcestershire, for Storage & Transport System Limited, 262/264, Regent Street, London, W.1, from which company similar tank wagons may be hired and further details obtained. Patents are being applied for by Storage & Transport System Limited.

Mechanised Grain Handling

AN all-mechanical method of moving grain in bulk from storage to railway wagon to receiver's hopper has been developed and now is in use on the North Eastern Region of British Railways.

The method was devised by Mr. R. E. Cook, Chairman & Managing Director of Yorkshire Grain Driers Limited, Harvest Mills, Dunnington, near York, with the co-operation of the Derwent Valley Light Railway Company (on which system Dun-

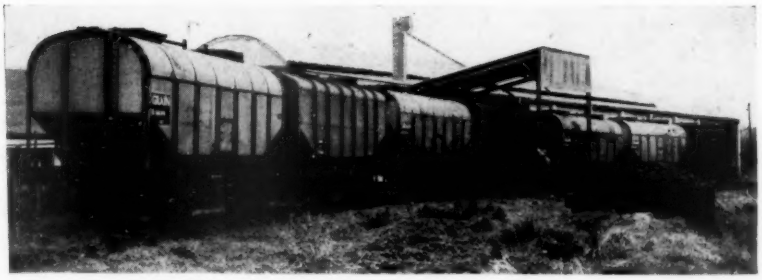


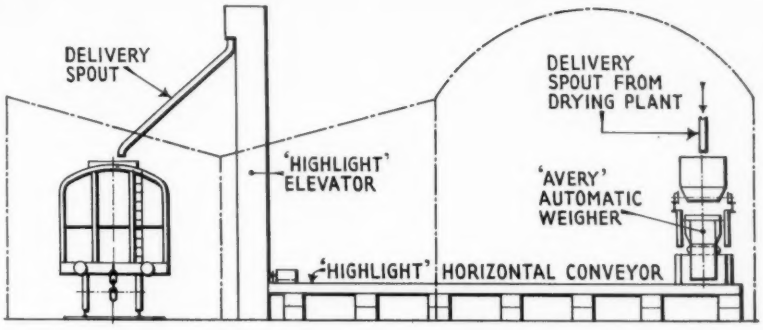
nington lies) and the North Eastern and Scottish Regions of British Railways.

The method is as follows: grain is conveyed from the drier to a hopper which incorporates a mechanical weighing and recording device. This ensures that the grain is delivered in hundredweights to a Highlight conveyor. On this, it is passed to a Highlight elevator, after which it moves by gravity through a spout into a waiting bulk grain van. The illustrations show (half-tone): a train of wagons in loading position; (diagram): the plant and process.

After conveyance by rail, the grain is discharged by gravity into a rail-level hopper provided by British Railways at destination. Delivery from this hopper to the 5-ton capacity road delivery vehicles also provided by British Railways is effected by "Mayrath" electric auger conveyors. The delivery vehicles tip the grain directly into receiver's storage hoppers.

Under use of the new system, casual labour and the provision and maintenance of transit bags are eliminated; storage space has become available for other use, and the whole operation has been so speeded that night work, even at the height of the season, has been reduced to no more than simple supervision. The despatching company has been able to remain competitive and maintain a valuable contract in the face of keen competition from other sources. Rate of "flow" is an average of 450 to 500 tons a week.





Radio-Telephone Terminal

A NEW five-channel transistorised VHF radio-telephone terminal has been developed. The equipment is a compact unit providing five high-grade telephone circuits at low cost. Height is 51 in., width, 23 in., depth, 19 in., and weight 266 lb.

The unit, which is intended for use over short or medium distances, is suitable for operation over secondary junction routes in large telephone networks or in independent systems. Its portability and ease of installation also make it suitable for emergency use. All units readily are removable through use of multi-way plugs and socket connections.

The radio transmitter and receiver conform to C.C.I.R. specifications in all characteristics. Standard frequency range is 156-184 Mc., though other frequency ranges can be supplied. Transmitter output is 30W, frequency deviation 75 kc. Receiver noise factor is 8db.

The five high-grade telephone channels, which are 4 kc. spaced, are complete with out-of-band signalling equipment and 2/4-wire terminations. The signalling equipment can be arranged for handling dialled impulses, ring down, or junction working. Crystal frequency control is used. The carrier equipment is fully-transistorised and embodies printed wiring and resin-cast components.

The equipment has been developed jointly by Redifon Limited, Broomhill Road, London, S.W.18, and Siemens Edison Swan Limited, Caxton House, Tothill Street, London, S.W.1, from either of which companies further details may be obtained.

Toroidal Voltage Regulator

A NEW range of toroidal voltage regulators now is available. Four basic sizes will be marketed as Troidac 2·5, Troidac 10, Troidac 20, and Troidac 40. Of these, the first and last two are in production. The Troidac 10 will be available shortly.

All units are designed for a nominal ratio of 240/270 V. or 240/240 V. Additional tappings are provided at approximately 25 per cent, 50 per cent and 75 per cent of the winding for use with auxiliary transformers.

The Troidac 2·5, rated current 2·5 amps., maximum 3 amps., is of unusual construction in that the core and the winding, apart from the brush track, are encapsulated in polyester resin. This arrangement protects the winding against damage in the "back of board" version and provides a fully-insulated and robust portable unit. The Troidac 10 also will be a resin-cast unit. The Troidac 20 is air-cooled.

The Troidac 40 is an oil-cooled unit rated at 40 amps. from 0 to 240 V. and 35 amps. from 240 to 270 V. A single unit will provide approximately 9·5 kVA of control and a three-gauge version can be provided. The oil-covered track and brushgear on this unit makes it particularly suitable for use under adverse atmospheric conditions.

All the regulators are wound on cores consisting of "cold-rolled" spirals and flux density is kept low to avoid undue distortion of output voltage waveform. The units also are available motor-operated, either as voltage regulators or as voltage stabilisers.

Drum-Lifting Device

A NEW version of a drum-lifting device already on the market is available. The new model, which incorporates a pre-loading safety mechanism, can be supplied to handle drums of any type, size, and weight.

The pre-loading safety mechanism involves the application of adequate clamping pressure before the drum leaves the floor. This is claimed to eliminate the danger of load-slip and to make the device suitable for "snatch"-lifting.

Principle of working is as follows: clamps remain "locked open" while suspended from a crane or hoist hook before lifting. When the device is lowered to the drum, a hand lever moving through 190 deg. sets the clamps in the "pre-loading" position. Supporting lever linkage mechanism further increases clamping pressure.

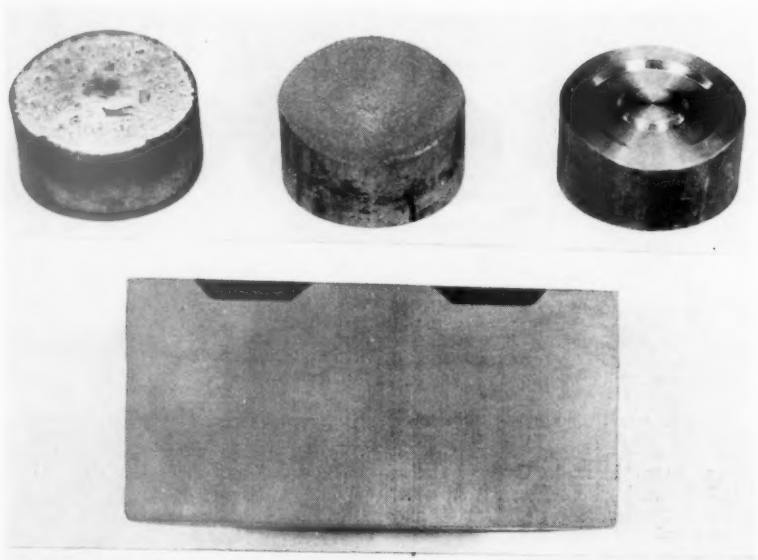
A power-operated model also is available. This is equipped with automatic or remote electrical control.

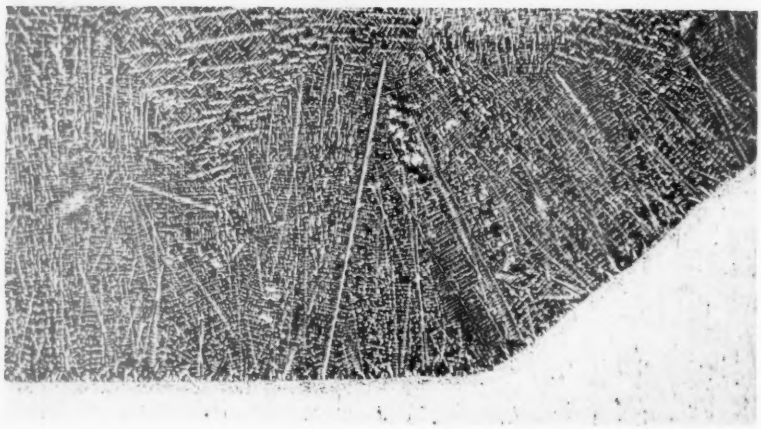
Further information can be obtained from the manufacturer, British Electrical Repairs Limited, Empire House, 10, Charlotte Street, Manchester 1.

Welding Pack

A TWO-IN-ONE pack now is available comprising a general duty and a cutting blowpipe. The case also contains 10 welding nozzles for use with the general duty model and three cutting nozzles for the cutting blowpipe. Cutting nozzles are made in seven sizes ranging from $\frac{1}{32}$ in. to $\frac{1}{8}$ in. The pack contains any three sizes to welders' requirements. Size of the pack, which is a neat metal box, is $22\frac{1}{8}$ in. by $7\frac{1}{8}$ in. by $4\frac{1}{2}$ in. Price is £18 18s.

Further details can be obtained from the manufacturer, Suffolk Iron Foundry (1920) Ltd., Sifbronz Works, Stowmarket, Suffolk.





New Hardfacing Process

A HARDFACING process has been developed which is claimed to offer advantages where resistance to abrasion, corrosion or heat is necessary such as on valve seatings, seat rings and discs, pump sealing rings, and thrust plates. Welding skill is eliminated and automatic heat control used. This results in a reduction in heating time and a more economic use of hardfacing alloys. The process is in an early stage of its development and intended to supplement other methods of depositing the manufacturer's alloys.

The process is carried out as follows: special powder and flux are placed in a prepared recess in the steel blank. The steel then is positioned adjacent to the work coil of the induction equipment. Push-button heating now is initiated with or without rotation of the parts. When the bonding temperature is reached, heating is stopped automatically. The illustration on this page shows (top) the three stages of treatment of a steam valve, beginning with the completed work; (centre) a cross-section after surface grinding; (below) a recess profile × 30 mags.

Sound deposits of controlled depth, freedom from slag inclusions, blowholes, and shrinkage porosity, maximum hardness, with good bond and adhesion, and well-defined junction line and very low iron dilution are advantages claimed from application of this method.

Further details may be obtained from Deloro Stellite Limited, Highlands Road, Shirley, Solihull, Warwicks.

ACCIDENTS ON EAST AFRICAN RAILWAYS.—Investigations into recent derailments and collisions on East African Railways & Harbours show that there were 105 such accidents on running lines in the first nine months of 1958, compared with 158 in the same period of the preceding year. The number of train-miles run during the period was a little under 9,000,000, slightly less than in the period January 1 to September 30, 1957.

New Diesel Locomotive Depot at Finsbury Park

Provision for replacement of steam by diesel motive power in Kings Cross area pending electrification

Work has begun on a diesel locomotive depot situated in Clarence Yard goods depot on the west side of the main Great Northern line of British Railways, Eastern Region, near Finsbury Park Station. The intention is to provide for the replacement during the next few years of steam by diesel motive power in the Kings Cross area, pending electrification. Forty-five 350-h.p. diesel shunting locomotives, ten 1,160-h.p. and five 2,000-h.p. diesel-electric locomotives are already based on the area. The 1,160-h.p. locomotives are used mainly on suburban passenger working and the 2,000-h.p. locomotives on main-line passenger workings, especially the "Master Cutler" Pullman expresses between Sheffield and London. The new depot is designed to cater for the additional diesel locomotives which will come into service.

The situation affords easy access to Kings Cross passenger and goods stations, to Ferme Park marshalling yard, and to the London area carriage sidings. It is intended that most of the locomotives should be stabled at Kings Cross passenger station, Hornsey, Hatfield, and Hitchin, so reducing light running, line occupation, and unproductive time of enginemen. Although servicing facilities will be available at Finsbury Park, servicing and running repairs in general are to be carried out at the stabling points. The depot will thus be free to effect periodical examinations and the heavier repairs.

The main shed is a steel-frame structure. The frame is a single span 111 ft. 6 in. and 18 ft. 6 in. to the eaves. The roof covering is double-skinned asbestos cement with glass fibre insulation, and continuous glazing. The sides consist of dwarf brick walls with full glazing over the remainder. The whole structure is carried on Holmpress piles, of which there are some 400.

The shed will contain six tracks, supported on beams. Each track will accommodate three locomotives. Permanent working platforms are being built at footplate level. Workshops, offices, stores, and staff amenities will be contained in a two-storey building at one end of the shed. Heating will be by continuous radiant strips, heated by high-temperature water supplied by an oil-fired automatic boiler. Ventilation will be by ducts and natural-type ventilators.

Maintenance of Electric Locomotives

The scheme includes a fuelling installation, sanding plant, battery-charging equipment, compressed air facilities, lifting hoists and runways, filter cleaning, and injector testing equipment. The shed has been planned to cater for an extension for the maintenance of electric locomotives when this becomes necessary.

The depot was designed under the general direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region. The piling is by Holmpress Piles Limited. The steelwork has been fabricated by Wright Anderson & Co. Ltd. The general construction work is to be carried out by Wimpey & Co. Ltd.

North Eastern Region Train Services

From January 5 there has been a considerable increase in diesel multiple-unit mileage in the North Eastern Region, including continuous runs of up to 118 miles in length, and some considerable acceleration where steam workings have been taken over by diesel trains. From York to Newcastle the 8.40 a.m., 12.34 p.m. (now 12.40), and 5.50 p.m., the first and third starting from Bradford and Leeds respectively, are all diesel trains; the 12.40 and 5.50 are via Stockton and Sunderland and are both accelerated by 17 min. The 6.56 a.m. from Newcastle to York, now a diesel, starts at 7.20 a.m. and is speeded up by 27 min. to reach York at 9.20 a.m.; the 11.15 a.m. from Newcastle to Leeds, also diesel, starts 20 min. later but is 1 min. earlier into Leeds, at 2.7 p.m.; while the 5.30 p.m. from Newcastle is accelerated 38 min. to York and extended to Leeds.

Additional diesel trains run at 6.55 a.m. from Darlington to Leeds and 11.20 a.m. from Middlesbrough to Harrogate, and certain other steam workings in the area are taken over by diesel trains. Between Doncaster and Hull diesel units also take up several steam workings; the 7.22 a.m. from Hull to Doncaster arrives at 8.35 a.m., 25 min. earlier, and thus now connects with the 8.51 a.m. from Doncaster to Kings Cross, due at 11.40 a.m. On the York-Hull line the closing to passenger traffic of Warthill, Fangfoss, and Cherry Burton has resulted in acceleration of the times of the diesel stopping trains, by 5—9 min.

Between Hull, Selby and Leeds all the local workings have now been taken over by diesel units, and there are some new fast diesel workings, at 10.50 a.m. from Hull, calling at Selby only and giving the fastest service of the day (62 min.) and at 9.25 p.m.; and the 10.45 a.m. and 2.55 p.m. from Leeds to Hull. Stopping trains are accelerated by up to 10 min. Except for the 8.15 a.m. business express from Scarborough to Hull and the corresponding 5.10 p.m. from Hull, all the remaining steam-operated trains between Hull, Bridlington, Filey, and Hull, are now worked by diesel units, involving accelerations of 10—15 min.

Even-interval diesel services have been begun in the Leeds-Bradford-Ilkley-Keighley-Skipton area. There are new hourly services from Leeds to Ilkley via Guiseley. A similar service throughout the day runs from Bradford to Ilkley. The result is nearly to double the number of trains over these two routes.

A similar even-interval service is provided from Leeds to Bradford Forster Square. The trains inter-connect at Shipley, so affording also an hourly service between Leeds, Keighley, and Skipton.

Between York and Sheffield all but the through long-distance trains are now diesel multiple-unit workings. The York-Leeds local service is similarly diesel worked.

Many other short-distance trips have been turned over from steam to diesel power, and with the January 5 changes the turning over to diesel traction in the North Eastern Region, apart from the through trains, is virtually complete.

Order of St. John for Mr. H. A. Short

Mr. H. A. Short, General Manager, North Eastern Region, and President, N.E. Region Ambulance Centre, receiving the insignia of Commander Brother of the Order of St. John from the Lord Prior of the Order, Lord Wakehurst, at an investiture on January 22, at St. John's Church, St. John's Gate, Clerkenwell, London

Parliamentary Notes

British Railways' Prospects

The House of Commons discussed, in Committee of the House as a whole, on January 21, Clause 2 of the Transport (Borrowing Powers) Bill, relating specifically to the extension of powers to the B.T.C. to borrow, and of the Minister of Transport & Civil Aviation to lend, to meet deficits on revenue account of British Railways.

Mr. Ernest Davies (Enfield E.—Lab.) said that an amendment which the Opposition had tabled on this clause proposed to extend the period during which repayment should take place, was ruled out of order. The clause as it stood provided that the repayment of any money borrowed to finance deficits, shall commence from the seventh year after the deficit has been incurred. When that was agreed upon, the prospects for the B.T.C. were far brighter than they were today, and in his view the Commission would find it very difficult to break even by 1962. They awaited with great interest the findings of the Minister's committee now reviewing the question of modernisation and seeing what was the earliest possible date when the Commission could break even.

Mr. J. Peyton (Yeovil—C.) interrupted to deny Press reports cited by Mr. Davies and others, that a committee of Tory back-benchers had drawn up a plan to divest the Commission of its ancillary undertakings.

The Deputy-Chairman (Sir Gordon Touche): We really cannot discuss rumours.

The debate was continued by Mr. G. Lindgrin (Wellingborough—Lab.), Mr. Leslie Thomas (Canterbury—C.), Major Sir Frankham (Buckingham—C.), Mr. Ernest Popplewell (Newcastle W.—Lab.), Mr. Charles A. Howell (Birmingham, Perry Barr—Lab.), and Mr. David Jones (The Hartlepools—Lab.).

Mr. Harold Watkinson, Minister of Transport & Civil Aviation, replying to many points raised, welcomed the wide discussion. He said there was never any attempt to lay down an arbitrary system of repayment. The date 1961-62 was not selected by the Government.

"I do not think it is for me," he added, "to be optimistic or pessimistic at this point. . . . The forecasts made by the Chairman, when he wrote to me as to the final out-turn of 1958, have been remarkably accurate. . . . Indeed, they have been almost exactly right."

Steps were taken to ensure that there was not a loss to competition. Indeed, the Commission was now winning more of the coal traffic available. Perhaps it was a sidelight, as Mr. Leslie Thomas had said, the gain which oil had over coal was after the price of coal had been raised to a high level, which made oil more attractive. Perhaps there was a lesson there for the railways. With the coming of the motorcar and intense competition, one could price oneself out of the market only too easily today.

It was for the Commission to forecast about its future. It was only fair to say that for the passenger side, in the latter part of 1958, against the corresponding periods in 1957, the figures were, for example, for the four weeks to September 7, 1958, ·5 million; for the four weeks to November 2, ·3 million; and then ·1 m. up for the four weeks ending November 30, and 1·8 m. up for the four weeks up to December 28. In other words, on the passenger side, where modernisation had had its first impact, there was a definite and ascertainable improvement. Whether that would hold for next year, or what the position would be, was not for him to say, but the Commission's own gauge had been so far the basis for the Government's financial arrangements, and it remained. If it came to a need for a reappraisal, the Commission must tell the Government and the country, but that position had not been reached yet.

Perhaps Mr. Thomas would allow him to discuss long-term finance at an earlier hour some other time, which he should be happy to do—but on the general issue whether the Commission was becoming over-burdened, although he did not entirely accept his view that it was bankrupt, it was certainly in the hands of its bankers—the Government. But this was a business with a £750 million turnover a year. Therefore, it should not be alarming if they found themselves talking in rather big figures.

"It is the Commission's own wish, as it is the Government's," Mr. Watkinson added, "that, as it is in the hands of the country, which is really its bankers, it should be subect to stiff financial discipline. That is not some form of bullying the Commission. It is the Commission's wish, as it is the Government's, and indeed, the wish of all sensible people, that in that situation, the Commission should have firm financial discipline as the spur to get itself out of its difficulties by its own efforts. It is only right and honest."

Unpunctuality of Trains

"Unpunctuality worries us all and does affect the financial position. One cannot go through a vast electrifying and modernisation plan and keep an exact scale of punctuality. It may be that the Commission would have been wiser—it is the business of the Commission and not mine—to have altered its timetables to less exacting schedules. Absolute punctuality figures, as quoted by Mr. Ernest Davies, are not an entirely fair test. If those long-distance trains which are five or ten minutes late are disregarded, the figures of unpunctuality are materially reduced.

"There are economies which Members are fond of criticising as being things which prevent the Commission doing what it wishes to do. Members with those views should read the modernisation plan again. They would see that this cutting down was always part of the plan. All that we are doing is to ask the Commission, and it has agreed, to do it more quickly. It is absolute nonsense to say that any of the difficulties with the Underground, or with the railway services, are due to cuts in capital expenditure.

"The future of the railways lies in a much smaller, much more efficient, and much more modern system. Those people who oppose that, are doing the greatest possible disservice to the railwaymen that it is possible for anybody to do.

"I am glad that the Opposition is not opposing the Bill, because on its provisions for modernisation rests the whole hope of railwaymen for the future. Any railwayman who believes in his job, as they all do, accepts that as true, and I am glad to hear from the Member for Enfield East that Members opposite accept that the Government are doing a very good job in providing that very large sum of capital to try and put the railways on their feet."

The Bill passed through Committee of the whole House without amendment, and was read a third time.

Questions in Parliament

Conversion of Railways into Roads

Earl Howe asked H.M. Government in the House of Lords on January 21 whether, in view of the closing down of branch lines all over the country, consideration had been, or could be given, to the transforming of such lines into roads.

The Earl of Gosford, Lord in Waiting: When a railway line near a proposed new road is to be closed permanently, the possibility of using it in the construction of the road is considered by the highway authority concerned, who must be satisfied that this is justified on both engineering and economic grounds. An example of such a conversion is the current Heads of the Valleys road-improvement scheme in South Wales, which uses part of the Abergavenney-Merthyr line.

Earl Howe: Does the initiative in such a case come from the local authority or from the Ministry of Transport?

Lord Gosford: When it is proposed to close a railway line, the Transport Commission inform the Ministry of Transport & Civil Aviation, which notifies the local authority concerned, in case the information may be of any value.

Lord Howe: Does the initiative come from the local authority or from the Ministry of Transport when there is a possibility of making use of the line as a road?

Lord Gosford: Local authorities are responsible for providing roads. They inform the Ministry of Transport of any roads which they propose to build in a certain area, and at the same time the Ministry of Transport informs them of any railways anywhere near that area which are to be, so to speak, derequisitioned.

Staff and Labour Matters

Unofficial Rail Strike

An unofficial strike of 400 men employed in the Outdoor Machinery Department of the Eastern Region of British Railways began on January 22 in support of a claim for a bonus scheme. The claim has been progressing through the standard machinery for some time. A vote was taken on January 27 for a return to work. The basis of resumption is an early talk on the men's claim.

Busmen May Go to Minister

Union leaders representing 230,000 busmen in all parts of the country are prepared to approach the Minister of Transport, Mr. Harold Watkinson, if their request, already turned down by the Executive and municipal bus employers, also is rejected by the provincial companies.

One-Man Buses

London Transport Executive and the Central Busmen's Committee are holding discussions on the introduction of one-man operated buses on certain single-decker routes in the Outer London area. It is understood that the Executive proposes to introduce such services on three routes and with 20 single-decker buses on May 13. Both figures would gradually be increased—the latter to 100. The Committee is thought to be willing to accept these proposals if the wages of drivers involved are raised by 45 per cent. One-man operators on "country" routes at present receive about 15 per cent more than basic wage.

Contracts and Tenders

All-steel passenger coaches for South African Railways

South African Railways has placed an order with the Union Carriage & Wagon Company, Nigel, Transvaal, a subsidiary of the Commonwealth Engineering Co. Ltd., of Sydney, New South Wales, for 392 all-steel passenger coaches to the value of some £5,000,000. Reunert & Lenz Limited, Johannesburg, has received a contract for 322 coach sets of cast-steel bogies to the value of £1,600,000. Other orders placed by South African Railways include a £645,750 contract with Linke-Hofmann-Busch G.m.b.H. for 70 main line brake vans; a £308,000 contract with Industrial Steels Limited (Australia) for 70 van sets of cast steel bogies; and two contracts to the value of £51,055 and £23,857 with the Chloride Electrical Storage Company for train lighting batteries.

New South Wales Government Railways has placed a contract with A. E. Goodwin Limited for 20 975-h.p. diesel-electric locomotives to the value of some £1,500,000. They are intended for branch line use. First deliveries are expected in June of this year with subsequent deliveries at the rate of three a month.

The Victorian Government Railways has placed a contract with Martin & King Pty., Limited, Victoria for 90 motor coaches, without bogies, for "Harris" trains.

Resistance Welders Limited, Inverness, has secured orders to the value of some £200,000 for welding machines for New Zealand, South African, and Rhodesia Railways, and an automatic rim and wheel welding machine for Czechoslovakia.

British Railways, Eastern Region, has placed the following contracts:—

W. & C. French Limited: demolition of part of existing Jubilee Shed and construction of asbestos cement partition at Stratford Motive Power Depot

Lorne, Stewart (Heating) Limited: reconstruction of No. 3 loading bank at high level at Commercial Road Warehouse, London, E.1

W. & C. French Limited: provision of standby power house extensions at Stratford, Chadwell Heath, Brentwood, Ramsden, and Prittlewell.

British Railways, London Midland Region, has placed the following contracts:—

Limmer & Trinidad Lake Asphalt Co. Ltd.: resurfacing of platforms, Citadel Station, Carlisle, and Preston Station

A. Monk & Co. Ltd.: additional warehouse facilities at Wavertree and Edge Hill, Liverpool for Rowntree & Co. Ltd.

Gerrard & Gerrard Limited: removal of silt from drainage heading, standage heading, and pump well at Shore Road pumping station, Birkenhead

Soil mechanics Limited: piling outwards parcel and mail traffic building, Euston Station

Boulton & Paul Limited: steelwork, new forwarded shed, Goods Depot, Chester General Station

Edward Wood & Sons Ltd: new parcels shed, Goods Depot, Chester General Station

Boulton & Paul Limited: supply and erection of structural steelwork, new parcels shed, Wavertree, Liverpool, and goods depot, Oldham Road, Manchester

R. G. Horton (Engineers) Limited: new forwarded shed, goods depot, Oldham Road, Manchester

Redpath Brown & Co. Ltd.: supply and erection of structural steelwork, new parcels shed goods depot, Oldham Clegg Street

Norwest Construction Co. Ltd: erection of parcels depot, Oldham Clegg Street

Richards Structural Steel Co. Ltd.: supply, fabrication, and delivery of girderwork, bridges 68, 70 and 73, Timperley & Garston line, and bridges 81 and 84, Speke Junction and Edge Hill line

Kyle Stewart (Contractors) Limited: staff association accommodation at Eldom Street Warehouse, Broad Street, London

Hughes & Ellison: alterations to footbridges over running lines, Crewe

Wm. Kay (Bolton) Limited: timber shell roof, parcels depot, Coventry

Andrew Air Conditioning Limited: mechanical ventilation to computer room, Locomotive Works, Derby.

British Railways, North Eastern Region, has placed the following contracts:—

Arthur Robinson (Contractors) Limited: filling behind sheet pile training wall to Stainsby Beck, Newport Marshalling Yard

T. W. Broadbent Limited: electric lighting in "B" shed and "C" floor, Grain Warehouse, Leeds Wellington Street

A. Innes Limited: electrical installation, Leeds Neville Hill Motive Power Depot

G. C. Hadden & Hillman Limited: oil storage tank enclosure, Heaton Carriage Sidings, Newcastle

W. Fairburn Limited: electrical installation, Hull Botanic Gardens Diesel Maintenance Depot

H. Bingham & Son Ltd.: locomotive sanding plant, York North Motive Power Depot.

British Railways, Scottish Region, has placed the following contracts:—

Standard Telephones & Cables, Limited: supply, termination, through jointing and commissioning of telecommunication cables, Perth

Telegraph Construction & Maintenance Co. Ltd.: supply, termination, through jointing and commissioning of telecommunication cables, Slateford-Craiglockhart new connecting line, Edinburgh

John Wright & Co. (Edinburgh) Ltd.: premises for Carriage & Wagon Engineer's Department, Slateford, Edinburgh, and office and amenities block, Townhill Junction new wagon repair depot, Dunfermline

P. Graham & Sons: demolition work, floors, roadways, etc., for conversion of Tay Bridge, goods shed to modernised warehouse, Dundee

Standard Telephones & Cables, Limited: train describers, Hyndland and Dumbarton new signalboxes

Whatlings Limited: renewal of superstructure of Drumchapel Road overbridge.

The South Australian Government Railways has invited tenders for the supply and delivery at its Islington Workshops of 10 general purpose diesel-electric locomotives of 900-1,000 h.p. in complete working order, with spare parts and equipment. Bids endorsed "Tender for Diesel-Electric Locomotives" should be addressed to the office of the Railways Commissioner, North Terrace, Adelaide, South Australia. The closing date is March 2, 1959. Drawings and specifications may be inspected only at the office of the Agent-General for South Australia, 499, Oxford Street, London, W.1.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From South Africa:

332 train lighting battery chargers, self-contained units housed in sheet metal cases suitable for wall mounting on an interior coach partition.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. C.7667: Battery Chargers" should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is February 6, 1959. Local representation is essential. The Board of Trade reference is ESB/2131/59.

From Pakistan:

120,000 broad gauge hard wood sleepers.

The issuing authority is the Government of Pakistan, Ministry of Communications, Railway Division. The tender No. is 59/1720/3/S. Bids should be addressed to the Director General (Railways), Civil Engineering, Railway Division, Ministry of Communications, Room No. 311, 2nd Floor, Tughlaq House, Shahrah Kamal Ataturk, Karachi. The closing date is February 16, 1959. The Board of Trade reference is ESB/1965/59.

From Portuguese East Africa:

1,194 smoke tubes for locos/60 to drawing No. 06-B-3.38.

The issuing authority is the Ports, Railways & Transport Department, Lourenço Marques. The tender No. is 26/59. The closing date is February 6, 1959. Local representation is essential. The Board of Trade reference is ESB/1310/59.

From Iran:

1,000 fastening clips for goods wagon tyres.

The issuing authority is the State Railways Administration. The tender specifications are with the Section des Adjudications et des Contrats de l'Administration des Chemins de Fer de l'Etat (Tehran). The closing date is March 7, 1959. The Board of Trade reference is ESB/1413/59.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

Notes and News

Higher Fares Proposed for Swiss Federal Railways.—The Swiss Government has submitted to Parliament a proposal to raise passenger fares on the Federal Railways by 11½ per cent as from September 1. A deficit of £2,500,000 on the Swiss Federal Railways is forecast for the current year. The reasons are stated to be increased costs, more particularly wages, and loss of traffic caused by road competition.

British Electrical Power Convention.—"Electricity and its contribution to the standard of living" is to be the theme of the eleventh British Electrical Power Convention which is to be held in Torquay from June 1 to 5, under the Presidency of Mr. C. R. King, Deputy Chairman, Central Electricity Generating Board. As in former years there will be an electrical exhibition associated with the convention. Although the exhibition will be officially opened by the President on the evening of June 1, it will be open to delegates all day.

One Passenger Station in Leeds.—Further reference to the combination of traffic at Leeds City and Central Stations was made on January 27 by Mr. E. E. Cowell, Traffic Manager, West Riding, British Railways, North Eastern Region. He was addressing the Leeds Chamber of Commerce. The two passenger stations, he stated, would be combined at a cost of well over £4,500,000. The scheme included accommodation for about 200 motorcars in an overhead car park. Eventually Leeds Central station would be closed. It would take about five years to execute the plan.

New Passenger Accommodation at Southampton Docks.—The British Transport Commission has recently brought into use a new waiting hall to serve berths 30 to 33 on the Itchen Quays, at Southampton Docks. The accommodation is formed at existing ground level inside the external walls of the shed, is of single storey construction with suspended ceilings. The facilities include an immigration office, shipping companies ticket stand, *bureau de change*, buffet, toilets, and telephones. Access for passengers from the railway platform on the west or landward side is by a communicating corridor 8 ft. wide and 42 ft. long. The waiting hall itself is 69 ft. long by 65 ft. wide. The waiting hall is furnished in contemporary style, with wall coverings in straight grained elm veneer. It is anticipated that the Itchen Quays will be used principally by vessels of Royal Mail Lines Limited, Holland-America Line, and French Line. The building was constructed by direct labour under the supervision of Mr. J. H. Jellett, the Chief Docks Engineer.

Argentine Train Services Interrupted by Industrial Unrest.—The Argentine railways were still running earlier this week, despite the almost general strike. Several services were interrupted by bombs placed on the track. Urban underground trains in Buenos Aires were reported to be running irregularly.

Accidents on E.A.R. & H.—There were 105 derailments or collisions on the running lines of East African Railways & Harbours during the nine months ended September 30, 1958, compared with 158 in the same period of 1957. The number of train-miles run between January 1 and September 30 of last year was just under 8,000,000, slightly less than in the same nine months of 1957.

Increase in Price of Fuel Oils.—Shell-Mex & B.P. Limited, the National Benzole Co. Ltd., the Power Petroleum Co. Ltd., and the Mobil Oil Co. Ltd., announced on January 26 increases of 1d. a gal. in the wholesale prices of derv and gas oil. This is expected to result in rises of £70,000 a year in the cost of British Railways and railway and cartage operations and of £125,000 a year in the cost of London Transport road services. Other nationalised transport undertakings also are affected.

E.S.C. Forms Permanent Magnet Subsidiary.—English Steel Magnet Corporation Limited has been formed as a wholly owned subsidiary of English Steel Corporation, Limited, to take over the permanent magnet business previously carried on by English Steel Rolling Mills Corporation, Limited. Plant for the production of permanent magnets, including well equipped machining, heat treating, and testing departments, is concentrated under one roof at North Street Works, Openshaw, Manchester, with unified control and administration. The Chairman of the Magnet Corporation is Mr. R. G. H. Taylor, and Mr. E. J. C. Patrick, formerly Manager of the Tool Steel Department, has been appointed Director & General Manager.

Glasgow Suburban Electrification.—Continuation of construction work in the Scottish Region of British Railways in connection with the Glasgow suburban electrification scheme will take place next week between Anniesland and Westerton, Westerton and Milngavie, and between Dalreoch and Cardross. Work will be carried out between the morning and evening peak traffic.

Pressed Steel Co. Ltd. Subsidiary in Common Market Countries.—The Pressed Steel Co. Ltd. has formed a subsidiary to act as its representative in the European Common Market countries. The name of the company is Pressed Steel Société Anonyme and its headquarters are at Galerie Ravenstein 30, Cantersteen 7, Brussels 1, where the showroom is situated.

Simplon Line Blocked by Landslide.—A fall of earth and rock on to a passenger train on the Simplon line of the Italian State Railways, between Domodossola and Iselle, at the southern end of the Simplon Tunnel, earlier this week, killed one and injured several passengers and blocked both tracks. The fall occurred at the entrance to one of several tunnels on this section. The "Simplon-Orient Express" was diverted via the Mont Cenis Tunnel and Turin.

Scottish Region Television Train Runs to London.—A Bridge of Weir firm has chartered the television train of British Railways, Scottish Region, to take some 250 customers to London for the Furniture Exhibition at Earls Court. The train was due to leave Glasgow Queen Street at 8.45 p.m. yesterday (Thursday) with over 100 passengers, who were to be greeted by a director of the firm on closed-circuit television, to see trade films from the Leather Institute and the British Transport film "The Land of Robert Burns," and to be entertained by a concert group. In each coach points are provided for use with a roving microphone

Passenger reception hall at berth 31 Southampton Docks, showing buffet and entrance to immigration room

Lounge section of the reception hall, showing pictures of Docks as wall decoration

and there are separate loudspeakers for recorded music. The train was routed to make special stops at Edinburgh Waverley, Newcastle, Leeds, Sheffield, and Nottingham to pick up passengers, and arrive at St. Pancras 8.6 a.m. It will return from St. Pancras at 10.47 p.m. tonight.

Kearns Machine Tools Exhibited in Australia.—At the Sydney Machine Tool Exhibition on May 11-16, McPherson's Limited, representatives of H. W. Kearns & Co. Ltd., of Broadheath, Manchester, is to exhibit three typical Kearns machines: an OB Optimetric horizontal tool room boring machine, and a No. 1 and a No. 3 Kearns patent horizontal surfacing and boring machine.

Reduced First Class Fares on Saturdays in the L.M. Region.—Besides the reduced first class fares in force on Saturdays since November, 1958, between some principal stations in the London Midland Region of British Railways, additional return fares are now available: London-Manchester 69s., London-Liverpool 73s., and London-Glasgow 150s. The return journey may be made on the same or on the following Saturday. These fares apply until April 25, except on March 28.

Westinghouse "Introduction to Industry" Courses.—The Westinghouse Brake & Signal Co. Ltd. states that as a result of the success of similar courses in previous years, it is again arranging one-week courses for school leavers at its Chippenham Works in 1959. These are designed to help boys to decide whether they wish to enter the engineering profession and should prove of particular value to those interested in careers connected with railway work. Two courses are planned at Easter and a third in August.

The Prime Minister Visits Head Wrightson & Co. Ltd.—The Prime Minister, Mr. Harold Macmillan visited the works of Head Wrightson & Co. Ltd. on January 14. He made a brief tour of the works, during which he saw some of the major fabrications for the iron and steel industry and the large heat exchangers for the Bradwell Nuclear Power Station in course of construction, and later inspected the steel foundry. He also met the directors and senior management of the company and spent some time with the workers' representatives on the Employees' Council.

International Plastics Exhibition.—The British plastics industry is to be represented by more than 200 firms showing the latest achievements in the chemistry, mechanics and merchandising of plastics at the International Plastics Exhibition to be held at Olympia, London, on June 17-27. Fully international for the first time since its inception in 1951, the exhibition also will show products from 14 other countries. The total floor area occupied will be over 270,000 sq. ft. and attendance is expected to exceed 90,000. British exhibits will include p.w.c. film and sheet, polythene, polystyrene, and an extensive range of products manufactured from these materials.

Diesel Locomotive Deliveries.—Some 30 main-line diesel locomotives should be delivered to British Railways this year on the basis of present orders. By the end of 1958, 103 main-line diesel locomotives were in operation on British Railways and almost all of them had come into commission during the year. Except for eight which were assembled in the railway workshops, they all came from private industry. This year, some 100 main-line diesel locomotives should be delivered by the workshops, and about twice that number by the manufacturers, therefore the majority of the 650 already ordered should be in commission. Exports of diesel locomotives of 275 h.p. and over have fallen from 149 in 1956, to 55 in 1957, and 25 in the first nine months of 1958.

Associated Commercial Vehicles Limited.—An improvement in trading prospects during recent months is reported by Lord Brabazon of Tara, Chairman of Associated Commercial Vehicles Limited. The rationalisation and reorganisation of the group should bear fruit during the current year, provided there is no major upheaval in the industrial or political world.

General Motors Diesel Limited New Range of Engines.—General Motors Diesel Limited, London, Ontario, has announced the addition of eight new basic units to its line of two-cycle diesel engines. The G.M. diesel line, formerly covering the 30- to 893-h.p. range, has been broadened into an all-purpose power line offering single, multiple, and turbo-powered engines from 20 to 1,650 h.p.

Martonair Limited, New Branch Offices.—Two branch offices have been opened by Martonair Limited, which manufacture pneumatic equipment. One, including a stockroom, is at the Central Administration Building, Team Valley, Gateshead 11. Mr. C. P. White is the technical representative for the North-East. In Birmingham, a showroom, stockroom, and office at 46, Great Hampton Street, replace the offices in Holyhead Road. Mr. R. A. Young remains Manager.

Re-introduction of "Starlight Special" Service.—The "Starlight Special" trains, which afford travel at considerably reduced fares between London and Edinburgh and London and Glasgow, will run again this year at Easter and during the main holiday season. Departure dates are March 26 from London and March 27 from Scotland, and every Friday from May 15 to September 11 inclusive, in both directions. Passengers return on the Saturday week or Saturday fortnight after their departure. The fare of 85s. for the return trip guarantees a seat, and light refreshments are available in the trains. Advance bookings may be made now in London at principal stations and ticket agencies, and in Scotland at Glasgow St. Enoch and Edinburgh Waverley Stations.

British Standard for Wood Preservatives.—The new British Standard publication B.S. 3051:1958, Coal Tar Oil Types of Wood Preservatives (other than creosote to B.S. 144) deals with two types of distillates for the satisfactory preservation of wood but outside the scope of B.S. 144. The first type is obtained from high-temperature carbonization processes, the second from other carbonisation or gasification processes. These distillates are primarily suitable for the hot-and-cold dipping process or for brush treatment of the wood. They should not be used for woodwork subsequently to be painted or likely to be in proximity to food. Requirements are prescribed for specific gravity, liquidity, water content, distillation range, phenols, and matter insoluble in toluole. Limits are specified for flash point and saturated hydrocarbons. Copies of this standard, price 5s., may be obtained from the British Standards Institution, 2, Park Street, London, W.1.

Forthcoming Meetings

January 31 (*Sat.*).—Permanent Way Institution, at the Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 2.30 p.m. Annual Winter Meeting: In the chair Mr. J. Ratter, President, followed at 5.30 for 6 p.m. by a Conversazione, at the British Transport Commission's Headquarters, 222, Marylebone Road, London, N.W.1.

February 2 (*Mon.*).—Institute of Transport, Metropolitan Section, at 80, Portland Place, London, W.1, at 5.30 for 6 p.m. Paper on "Railway reorganisation and its purpose," by Mr. G. F. Fiennes.

February 3 (*Tue.*).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, Cardiff Section, at the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. Paper on "The mechanical & electrical department of the South Wales Docks since nationalisation, illustrated by Mr. E. R. Radway, Mechanical & Electrical Engineer, South Wales Docks.

February 3 (*Tue.*).—Permanent Way Institution, Leeds & Bradford Section, in the British Railways Social and Recreation Club, Ellis Court, Leeds City Station, at 6.45 p.m. Paper on "The reconstruction of Temple Mills marshalling yard," by Mr. E. R. Newens, Assistant District Engineer, Stratford.

February 3 (*Tue.*).—Institute of Transport, Irish Section, at the C.I.E. Club, Dublin, at 6.15 p.m. Paper on "Transport costs," by Mr. H. E. Osborn.

February 3 (*Tue.*).—Institution of Civil Engineers, at Great George Street, Westminster, S.W.1, at 5.30 p.m. Paper on "Preliminary planning for the new Tube railway across London."

February 3 (*Tue.*).—Institute of Transport, at the Connaught Rooms, Great Queen Street, London, W.C.2, at 12.30 for 1 p.m., informal luncheon. Guest speaker, Sir Ralf Emerson.

February 4 (*Wed.*).—Institution of Railway Signal Engineers, London Section, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m. Paper on "The protection of facing points," by Mr. O. S. Nock.

February 4 (*Wed.*).—Institute of Transport, Irish Section, at the United Services Club, Dublin. Annual dinner and visit of President.

February 4 (*Wed.*).—Institute of Transport, Leicester Group, at the City Transport Offices, Leicester, at 7 p.m. Paper on "Goods station working," by Mr. G. Collins, Vice-Principal, Railway Staff Training College, Derby.

February 4 (*Wed.*).—Electric Railway Society, at the Fred Tallant Hall, 153, Drummond Street, London, N.W.1, at 7.15 p.m. Paper on "Ealing to South Harrow," by Mr. A. A. Jackson.

February 5 (*Thu.*).—Institute of Transport, Northern Ireland Section, at Belfast Castle, Belfast. Annual dinner and visit of President.

February 5 (*Thu.*).—Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. Paper on "The Metropolitan Railway in its electric days," by Mr. V. Goldberg.

February 5 (*Thu.*).—Railway Students' Association. Debate on the motion "That the decentralisation of management does not necessarily improve

efficiency." Joint meeting with the British Railways, Western Region, London Lecture & Debating Society, at Paddington, at 5.45 p.m.

February 5 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, at Paddington, at 5.45 p.m. Debate with the Railway Students' Association.

February 6 (*Fri.*).—Institute of Transport, Western Section, at the Docks Office, Bristol, at 1.15 p.m. Paper on "British waterways," by Major-General Sir Reginald Kerr.

February 6 (*Fri.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Annual general meeting, followed by a display of railway photographs covering the period 1895-1905.

February 6 (*Fri.*).—Stephenson Locomotive Society, Scottish Area, at 25, Charlotte Square, Edinburgh, at 7 p.m. "Some notes on the Drummond period of the Caledonian locomotive history," by Mr. A. J. S. Paterson.

February 7 (*Sat.*).—Stephenson Locomotive Society, Scottish Area, at 302, Buchanan Street, Glasgow, at 2.30 p.m. A talk on the Scottish Region Archives Department, by the Curator, Mr. Hogg.

February 7 (*Sat.*).—Stephenson Locomotive Society, North Western Area, at the Y.M.C.A., Fargate, Sheffield, at 6.30 p.m. Paper on "London & North Western locomotives and their work," by Dr. W. A. Tuplin.

February 7 (*Sat.*).—Railway Correspondence & Travel Society, Bristol & District Branch, at the Grosvenor Hotel, Bristol, 1, at 7.30 p.m. Paper on "The Claughtons of the L.N.W.R." by Mr. R. M. Tomkins.

February 9 (*Mon.*).—Institute of Traffic Administration, Birmingham, at the Cosmopolitan Club, Fore Street, Birmingham, at 7.15 p.m. Paper on "Railway Modernisation," by a British Railways speaker.

February 10 (*Tue.*).—Institution of Civil Engineers at Great George Street, Westminster, S.W.1, at 5.30 p.m. Paper on "Automatic Analysis of steel framed structures under fixed and varying loads," by Mr. Jacques Heyman.

February 10 (*Tue.*).—Electric Railway Society, at the Exchange & Engineering Centre, Birmingham, at 6.45 p.m. Paper on "The Guernsey Railway," by Mr. G. C. J. Morris.

February 11 (*Wed.*).—British Railway, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1, at 5.45 for 6 p.m. Paper on "Steel rythm," illustrated, by Mr. Charles Ryon, United Steel Companies Limited.

February 11 (*Wed.*).—Railway Discussion Group, at the Technical College, Eastfield Road, Peterborough, at 6.45 p.m. Paper on "The catering services," by Mr. C. W. Roundell, Principal Assistant Refreshment Rooms, British Transport Hotels & Catering Services, London.

February 12 (*Thu.*).—Institution of Railway Signal Engineers, York Section, at the Signalling School, Toft Green, York, at 5.30 p.m. Paper on "Colour-light signalling principles including the application of C.T.C.," by Mr. D. G. Parker, British Railways, North Eastern Region.

February 12 (*Thu.*).—Stephenson Locomotive Society, London & Southern Area, at Caxton Hall, Westminster, S.W.1, at 6.45 p.m. Paper on "Several years of railway photography," illustrated, by Mr. E. R. Wethersett.

February 13 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, London, N.W.1, at 7.15 p.m. Paper on "The Leek & Mamfold Railway," by Dr. J. R. Hollick.

February 14 (Sat.).—Railway Correspondence & Travel Society, South of England Branch. Annual Reunion and dinner at Eastleigh.

February 14 (*Sat.*).—Stephenson Locomotive Society, North Western Area, in the Conference Room, Liverpool Central Station, at 7.30 p.m. Paper on "The Welshpool & Llanfair Light Railway," by Mr. S. H. P. Higgins.

February 14 (*Sat.*).—Stephenson Locomotive Society, North Western Area, at the Manchester Geographical Society, St. Mary's Parsonage, Deansgate, Manchester, at 6.15 p.m. Paper on "The Isle of Man Railway," by Mr. J. D. Darby.

February 16 (*Mon.*).— The Historical Model Railway Society, at Caxton Hall, Westminster, S.W.1, at 7 p.m. Slides of L. & N.W.R. subjects through the epidiascope by Mr. G. H. Platt.

Railway Stock Market

With general election doubts coming to the fore, stock markets have displayed some uncertainty, but the amount of profit-taking was extremely small when the big gains recorded in share values in the past month or so are borne in mind. The City remains hopeful of important tax concessions in the Budget and there is persistent talk that purchase tax may be reduced before the Budget. The rather lower prices attracted buyers, but in general buying has been a good deal more selective.

Best feature among foreign rails was a rally in Antofagasta, the ordinary being 14¼, compared with 12¾ a week ago, while the preference stock gained a point at 27½. The 5 per cent Bolivia debentures were 95. International of Central America common shares were $25½ and the preferred ordinary stock $109, but quotations were apparently not tested by dealings, both stocks remaining firmly held. San Paulo Railway 3s. units remained at 2s. and United of Havana second income stock was again 6 with the consolidated stock at 1¼. Chilean Northern first debentures were 53, Costa Rica ordinary stock 13, and Guayaquil & Quito assented bonds 78½, while Paraguay Central prior debentures were again quoted at 12½.

Canadian Pacifics rose on balance from $54 to $55, again moving closely with Wall Street. The 4 per cent preference stock eased to 54, and 4 per cent debentures to 66. White Pass shares were fractionally easier at $14.

West of India Portuguese capital stock rose further to 102 and the 5 per cent debentures were 90. Buyers remained in evidence for Nyasaland Railways shares, which changed hands up to 15s. 9d. Emu Bay 4½ per cent debentures marked 38 and Midland Railway of Western Australia income debentures 12½.

There were small indefinite movements among shares of locomotive builders and engineers, but Wagon Repairs 5s. shares have risen sharply to 10s. 7½d. Gloucester Wagon 10s. shares eased to 16s. 10½d. On the other hand, Beyer Peacock 5s. shares remained steady at 9s. and Charles Roberts 5s. shares eased to 10s. 6d. C. D. Peters shares, which remained held firmly, were quoted at 27s. 6d. Birmingham Wagon were 18s. 9d., and North British Locomotive came back from 13s. 9d. a week ago to 13s. Westinghouse Brake, after rallying to 43s. declined to 42s, which compared with 42s. 6d. a week ago.

A feature has been a sharp advance in F. Perkins 10s. shares to 16s. 7½d. following the take-over bid made by Massey-Ferguson. At one time last year these shares were down to 8s. and the take-over offer of 17s. 3d. per share is regarded in the City as a very fair offer. Triplex Holdings 10s. shares have strengthened to 49s. 6d. on the new process for producing glass announced by Pilkington Brothers; the glass is already being supplied to Triplex. In other directions, British Timken shares have reacted from 62s. to 60s. 3d. after their recent strength. Stone-Platt Industries shares eased from 45s. 10½d. a week ago to 45s. 3d. Vickers came back with the prevailing market trend from 36s. 6d. a week ago to 35s. 4½d. and Cammell Laird 5s. shares from 9s. 10½d. to 8s. 10½d.

General Electric shares fell sharply and were 34s. 3d. compared with 39s. a week ago, the reduction in the interim dividend from 3½ per cent to 3 per cent, although small, coming as a surprise as did the news that profits for the year are likely to be lower. Higher costs, and large expenditure on research are mentioned as the contributing factors, but turnover has shown improvement. Associated Electrical shares fell from 58s. 6d. to 55s. 6d., but firmed up later following the statement by Lord Chandos that the 15 per cent dividend is expected to be maintained. English Electric at 58s. compared with 59s. 9d. a week ago, and Crompton Parkinson 5s. shares came back from 13s. to 12s. 3s. Dowty Group eased from 45s. 6d. to 44s. 3d. with the general trend, and Pressed Steel 5s. shares receded from 24s. 7½d. to 24s.